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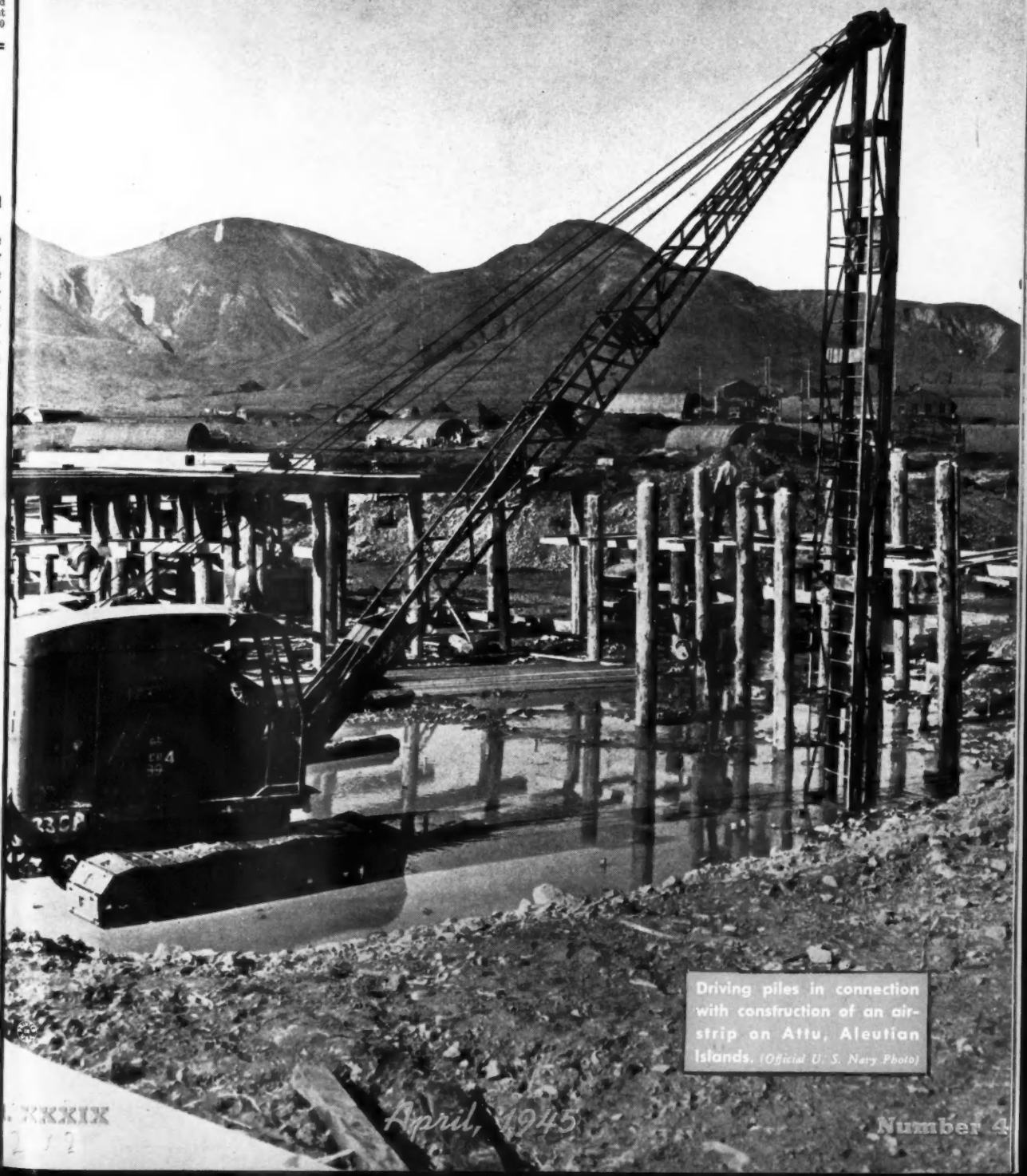
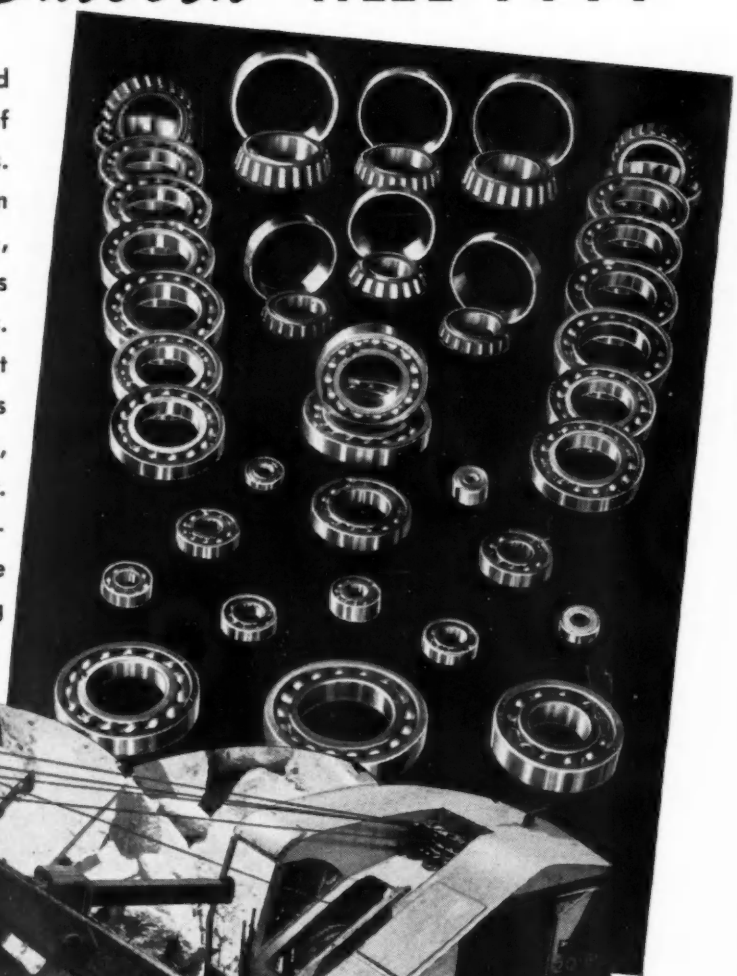


Driving piles in connection with construction of an air-strip on Attu, Aleutian Islands. *(Official U. S. Navy Photo)*

April, 1945 Number 4

MORE OUTPUT....

THE *Smooth* WAY....



There's an extra output dividend when power rides to the point of action on anti-friction bearings. Every power transmitting part on the revolving frame of ⅜-, ½-, and ¾-yard Bucyrus-Eries is mounted on ball or roller bearings. That means smooth, big-output performance because friction is reduced, alignment maintained, parts held in accurate adjustment. The resulting easy sustained operation means lower maintenance and longer yardage-producing machine life, too.

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Smooth performance with anti-frictions is only one of numerous reasons why Bucyrus-Eries are output leaders in excavating on the battlefronts and at home. The full Bucyrus-Erie performance story will convince you.

SO. MILWAUKEE

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Published Monthly by
THE EXCAVATING ENGINEER PUBLISHING COMPANY
South Milwaukee, Wisconsin, U. S. A.

F. O. WYSE, Publisher — J. D. GRACE, Editor
D. B. REED, JR., Managing Editor — E. W. ARNDT, Art Editor
E. M. HEUSTON, Sales Manager

ABC Member Controlled Circulation Audit

egular Subscription (payable in advance): 25 cents per copy, $2.50 a year: Canada nd foreign, subject to publication policy, $3.50 per year. Special subscription: Upon ritten request on company letterhead this publication will be sent (not regularly) ee of charge to companies, executives and supervisors engaged actively in excavating.

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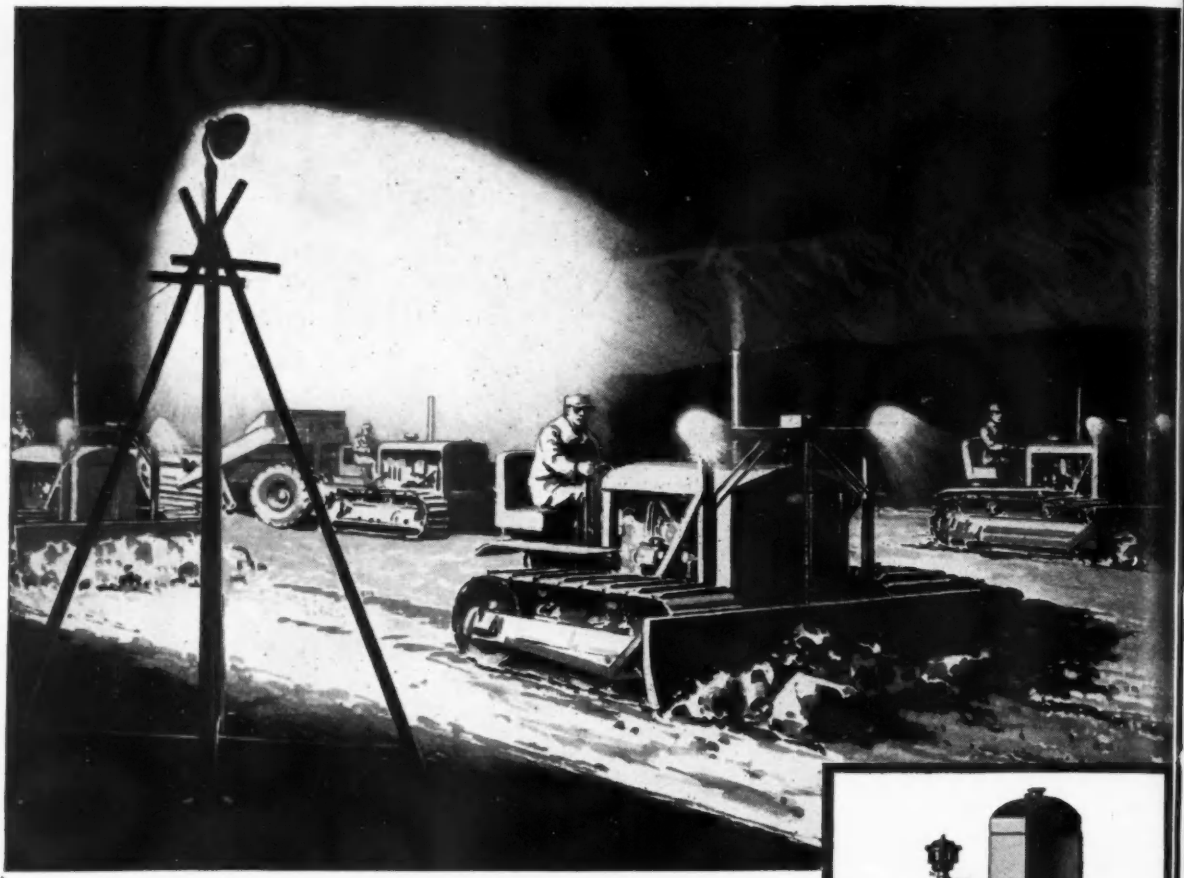


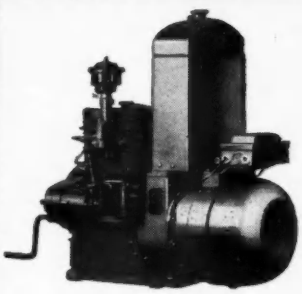
Seabees save an Airport

and KOHLER Electric Plants win a citation for service in night-lighting the job

WE quote, in part, from a telegram received August 2, 1944 from Vice Admiral Ben Moreell (CEC) USN, Chief of the Bureau of Yards and Docks:

"The excellent service rendered by one of your 2KW electric plants in providing night illumination for an emergency repair job at an important airport in the Aleutians is cited in a report from a Navy Construction Battalion. The settling of a large section of air strip threatened to halt all air operations at the field unless speedy repairs were effected. Your electric plant enabled the Seabees to work nights as well as days . . . without loss of time."

This fine tribute to the rugged reliability of Kohler Electric Plants will be no surprise to many contractors and engineers throughout the country. They know from long experience how well these compact units serve on excavators, dredges, draglines and portable equipment in the building of roads, dams, bridges, and countless other projects. Kohler plants not only floodlight night working areas but also drive motors, pumps, air compressors, lathes, drills and portable electric saws. Their uniform efficiency is the result of years of manufacturing experience.



Kohler Model E Electric Plant. 1500 watts, 115 volt DC—Hand cranked. For heavy-duty, economical, continuous service.

Model E, most commonly used in construction work, is now available to essential users. Write for full information. Kohler Co., Dept. EE-4, Kohler, Wisconsin. Established 1873.

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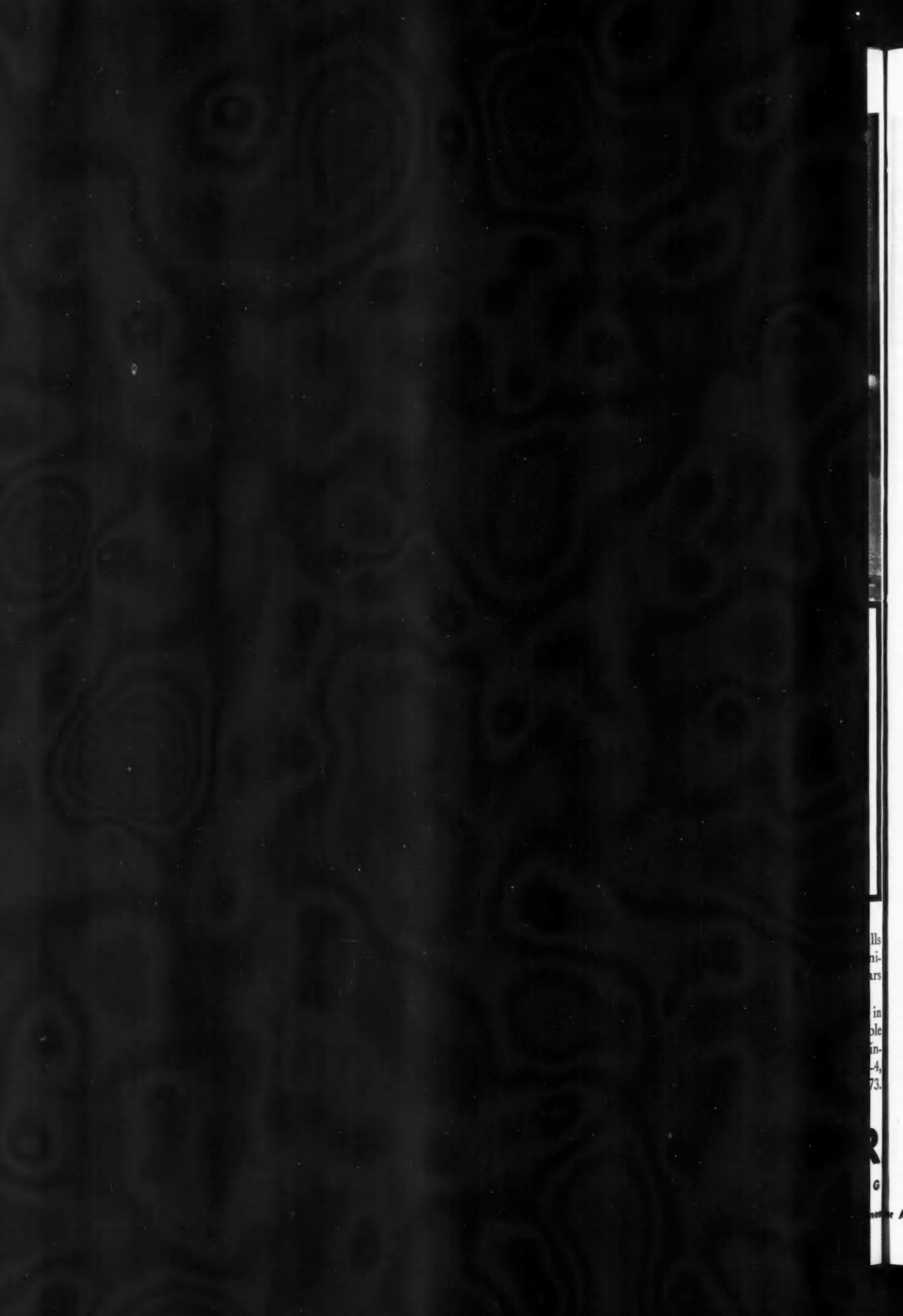

TOURNAPULLS
• Speed Mining Operations on British Guiana Bauxite Property

Demerara Bauxite Company uses LeTourneau fleet to strip overburden; build and surface roads; clear land and build railroad grades

To speed handling of its wide-scale mining operations in British Guiana, progressive Demerara Bauxite Company has added 2 150 h.p. Super C Tournapulls to its fleet of 25 Le Tourneau Carryall Scrapers, 12 Dozers and 2 Rooters.

Big Tires Provide Flotation

These fast-moving, 15-yard Tournapull-Scraper units, with their 14.9 m.p.h. speed, are building roads in tough, sandy working conditions. Their big-diameter, low-pressure pneumatic tires enable these self-propelled scraper rigs to keep moving, where small-tired trucks bog down.

Road Surfacing—A Profitable "Extra"

Like all big-capacity scraper units, these Tournapulls are loaded with aid of a pusher, haul and spread their loads in fast-moving cycles. Here, Demerara Bauxite Co. takes fullest advantage of Tournapulls by using them to spread bauxite on the roadbed for a high-speed, all-weather surface—a Tournapull specialty.

Give Scraper Costs On Truck Hauls

Like this alert mining company, you will find, too, that the faster power of Tournapulls will: (1) Give you job-proved Carryall Scraper earthmoving economies at truck speeds—on both long and short haul work. (2) Enable you to do more work with fewer men and machines, because they are self-contained, loading-hauling-spreading units; are one-man operated.

For more information on what Tournapulls can do on your roadbuilding, stripping and other mining jobs, write direct to R. G. Le Tourneau, Inc., Dept. EE-445 Peoria 2, Ill.

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*Trade Mark Reg. U. S. Pat. Off.

BUILDING, SURFACING ROADS is assigned to high speed Tournapulls on Demerara Bauxite Co.'s British Guiana property.

STRIPPING SAND OVERBURDEN, ranging from 1 to 60 feet deep. LeTourneau Carryall Scrapers strip and get big loads as efficiently along the 1-foot layer as they do on the 60-foot overburden sections. Down hill loading is used.

BUILDING 40-MILE RAILROAD GRADE—almost half of it double-track line—is handled with speed and economy by part of Demerara Co.'s fleet of 25 LeTourneau Carryall Scrapers.

CLEARING RIGHTS-OF-WAY—Demerara Bauxite Co. uses 12 LeTourneau Dozers for its heavy clearing, interchanges Dozers with Carryalls to finish grades—smart tractor-saving operation!

"Say, Rembrandt, I suppose you're gonna' put dynamite in every one of those!"

"I don't give a continental if you are mad with him — turn around and work right!!!

"— and this is Mr. Murchison, our Powder monkey."

"Ya' got me! He says he's had a depressed feeling himself all morning!"

"If this is th' date here with Mabel you said you'd dig me up — you musta' used your shovel to do it."

"Well, you were the one who thought we should give them a free hand!"

BIGGER PAY-LOAD PERFORMANCE...

HAISS clamshells have a rich claim staked out in contractors' preference. They are known to handle yardage faster, and to outdistance all ordinary conceptions of lifetime yardage capacity ... Their digging efficiency catches the eye. Non-pocketed sheaves effect definite rope economy—a 40% increased efficiency in one competitive comparison ... These and other Haiss Bucket advantages will make money for the man who pins his faith to these "Hi-Power" Digging Buckets and "Multi-Sheave" Rehandlers.

Check HAISS for Hi-Power closing ratios up to 7:1

Check HAISS for a lower sheave block design that's tops

Check HAISS for a super-rigid cast steel head frame

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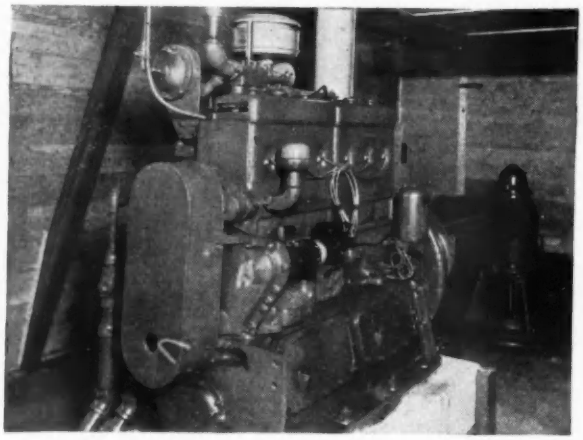
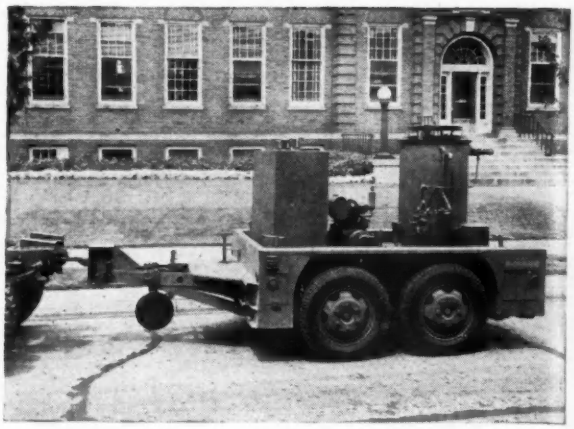


Pumping a domestic water supply is no job for a weakling. It takes a tough engine with unfailing ignition. This Waukesha Natural Gas engine, installed by the Frazier-Wright Company for the California-Michigan Land & Water Company, East Pasadena, California, keeps pumping steadily with the aid of a WICO magneto.



In modern war, smoke generators, on land as well as at sea, save lives and permit maneuvers impossible without the screen. This smoke generator, built for the roughest kind of field service by the Heil Company, is equipped with a WICO magneto for reliability.

John Deere tractors, little and big, are made to take the rough treatment unavoidable on farms in wartime. The work is too hard and too long to permit time for babying farm implements. This Deere tractor, WICO equipped, doesn't need it.

Good tractors are all-purpose implements. They must do all kinds of jobs, rain or shine. This HG-42 Oliver "Cletrac," using belt power to operate a saw mill, will be doing other hard jobs tomorrow. So it must have dependable ignition—and it has, with a WICO magneto.

Little jobs as well as big jobs take strong, dependable engines. Indeed a small one often takes a far greater beating in proportion to its size and weight. The same is true of all its parts, of which one, in the case of this Jacobsen Power Mower, is a WICO magneto.

LEADING manufacturers of engines and machinery select WICO because they must have magnetos which will live up to the finest reputations. These engineer-buyers of WICO magnetos know that this company, which has for more than twenty years specialized in the "heart" of internal combustion motors, can be depended upon to deliver magnetos that are uniform, and uniformly reliable. WICO pioneered mass production methods in magneto manufacture. The result is that nowhere else is so good a magneto available for so little. Wico Electric Company, West Springfield, Massachusetts.

WICO

"What Macwhyte PREformed Wire Rope means to me!"

MACWHYTE G-15 CATALOG

"Quick, easy handling . . . smooth, uniform spooling . . . long, economical service — those are some of the *plus* benefits I get from Macwhyte PREformed," says the typical wire rope user.

Why Macwhyte PREformed is preferred

All wires and strands in a Macwhyte PREformed rope are formed into a spiral, so that they lie naturally in place. Because it is free from internal stress, a Macwhyte PREformed rope has great fatigue resistance. Internal friction caused by wires and strands moving against each other is sharply reduced, resulting in a minimum of internal wear.

In Macwhyte PREformed, every strand in the rope is under uniform tension. There is no "early" wearing out of some strands while others "loaf." The perfect balance of strands makes Macwhyte PREformed exceptionally kink resistant.

Other User Benefits

Macwhyte PREformed on your equipment means fewer shut-downs, less trouble. It is safer to use because it can be cut without seizing—broken strands won't wicker. The extreme flexibility of Macwhyte PREformed makes it hug the drum, reduces wear both on the wires and in the groove of the sheave. Because of its long life, Macwhyte PREformed gives lowest possible cost per load carried.

All this, and Macwhyte Internal Lubrication, too!

Every wire in every strand of Macwhyte PREformed rope is coated with Macwhyte internal lubricant to protect against moisture, rust and ordinary acids. Heavy and tenacious, it clings to the wires unaffected by temperature changes.

The demands of our armed services are so great now, there may be times when we cannot give you our usual prompt service and delivery. The situation changes from day to day, so please keep trying. We'll serve you if we possibly can.

MACWHYTE PREformed WIRE ROPE — Plus Internal Lubrication, Selected Steels, Tested-Proved

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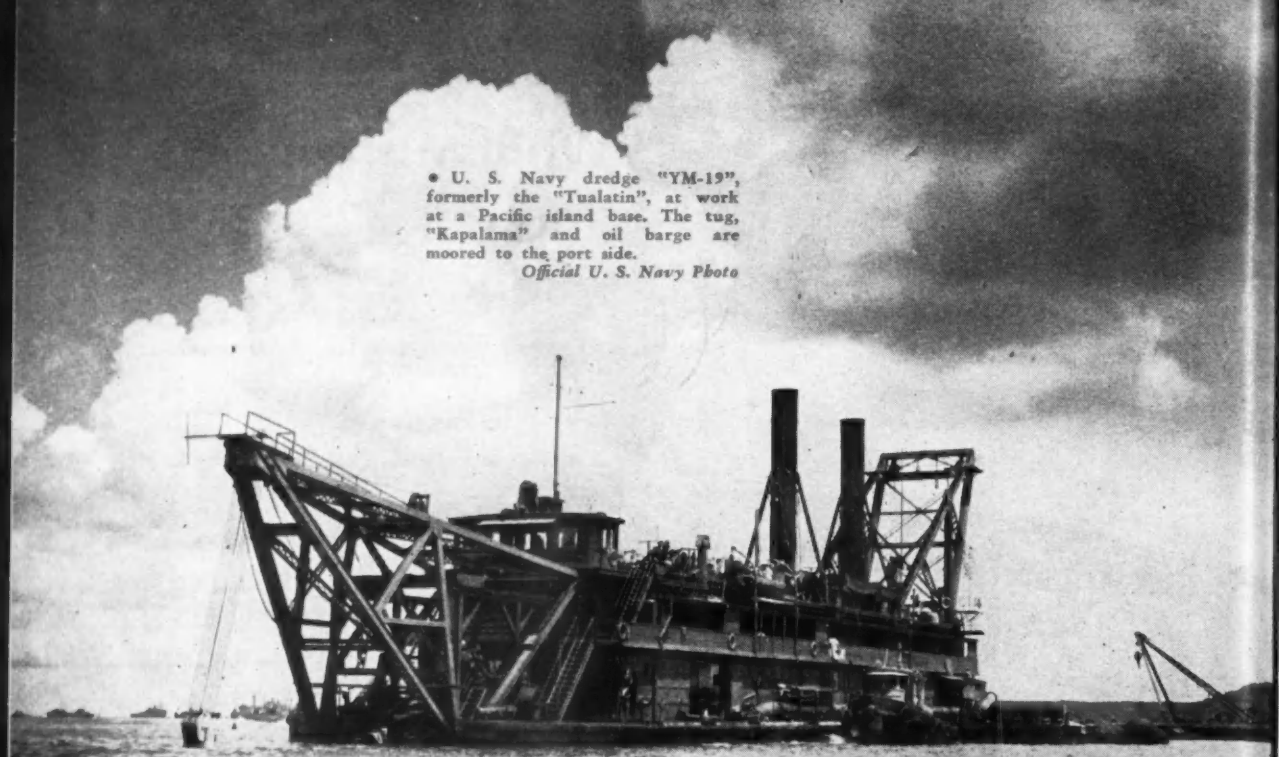


• U. S. Navy dredge "YM-19", formerly the "Tualatin", at work at a Pacific island base. The tug, "Kapalama" and oil barge are moored to the port side.
Official U. S. Navy Photo

Seabees Dredge at Island Base

Only completely seagoing battalion of Seabees use 30-inch hydraulic dredge, 'Tualatin', purchased by Navy and renamed, 'YM-19', to develop naval base at Pacific island. Dredging job involved removal of 400,000 cu. yds. of coral and construction of 13 acres of new land.

By R. P. DAY

ON A JOB HIGHLIGHTED by its careful planning, U. S. Navy Seabees of a Construction Battalion have developed the marine portion of a naval base in the Pacific in the amazing time of 29 working days. The job involved the removal of 400,000 cu. yds. of coral and the construction of 13 acres of new land, all by dredging.

Senior officers of the Construction Battalion planned the Pacific island job and then moved ahead to figure other work. So thoroughly did their orders cover every contingency that it was not necessary for them to revisit the island. Surveys, soundings and probings were taken. The job was mapped. Dredge cuts and the method of running the pipeline were laid out. When the dredge "Tualatin" came in, her crew of men and a few junior officers simply followed instructions, and the yardage rolled like clockwork.

Since there was no turning basin or approach channel, the few ships coming in to the dock had to pick their way through the coral heads. For the most part the Japanese anchored their supply ships offshore and unloaded them by the use of small barges and lighters. That is the same method we had to use ourselves until the Seabees moved in to correct the situation.

For some months a specialized Seabee battalion with the necessary know-how on dredging, underwater salvage and dock construction had been in the making. Men of all ages and ranks with that kind of experience were sifted out of other battalions. Probably no other outfit was so quickly assembled and sent out with its varied equipment. Seabees of this Battalion were on the way shortly after the big naval rifles on our battleships ceased firing on the smoking ruins of the island.

The 30-inch hydraulic dredge "Tualatin", owned by Hydraulic Dredging Company of San Francisco, had begun her long journey out into the Pacific late in 1941. At the time this island project was conceived, she was operating under a subcontract with the Hawaiian Dredging Company, Ltd., of Honolulu, in the lagoon at Midway Islands. This dredge was purchased by the navy and re-named the "YM-19".

Move YM-19 to New Location

When the Seabees arrived at Midway to take her over, the YM-19 had completed her part of the digging and was tied along the dock undergoing some engine room readjustments. Captain E. H. Norman and Chief Engineer J. B. Lockwood of the civilian organization were aboard, and they stayed on long enough to furnish much valuable assistance and infor-

mation regarding the operation of the dredge.

Swing anchors, spare parts, cable, pontoons and pipe-line, two extra spuds and other supplies were loaded. The dredge was picked up intact in a navy drydock, leaving her forward and stern gantry frames, spuds, cutter ladder assembly and smokestacks in place. She required no sea protection. She was braced against movement by wedging 12"x12" timbers from the dredge hull to the sides of the drydock. This bracing was placed on 10-foot centers.

The tug "Kapalama" and a loaded fuel barge were also placed in the drydock, making the total load about 3000 tons. The anchor barge, used in moving swing anchors ahead while digging, was stripped of its cabin and operating machinery and towed about 1000 feet astern of the drydock.

Towing through enemy waters differs considerably from the safe coastwise trips of peacetime, but these Seabees were so accustomed to that sort of thing that they crabbed, as usual, because life jackets were compulsory. The trip was made without any kind of mishap through 2000 miles of water, every drop of which had dangerous possibilities.

All the unloading had to be done the Japanese way. Dredge pipes had been disconnected from the pontoons for shipment, and the handling of these five-ton, 72-foot belled and balled sections was awkward. The Seabees lived up to their "Can Do" reputation by sealing each section with plywood or inflated rubber buoys and unloading them in the sea. Only two were lost. The rest were floated to shore where a site had already been picked for the dredge yard. There the floating line was assembled.

Two spare steel spuds in the drydock were lashed to four pipeline pontoons, using 7/8" cable and Crosby clips. These spuds, weighing 25 tons each, were floated close to shore and anchored, because it was expected that they would have to be handled again very soon.

A Northwest Model 6 crane, with a 40-foot boom, powered by a ME6 Murphy diesel engine, was borrowed and used to erect pontoon lines. A small 3/8-cu. yd. Insley crane was also used to arrange material and store spare parts in the dredge yard. Seabees swarmed over the anchor scow, re-erecting her A-frame, cabin and 3-drum American hoist in 10 hours. This machinery is mounted on a wooden barge 50 feet long by 30 feet wide.

Start of Operations

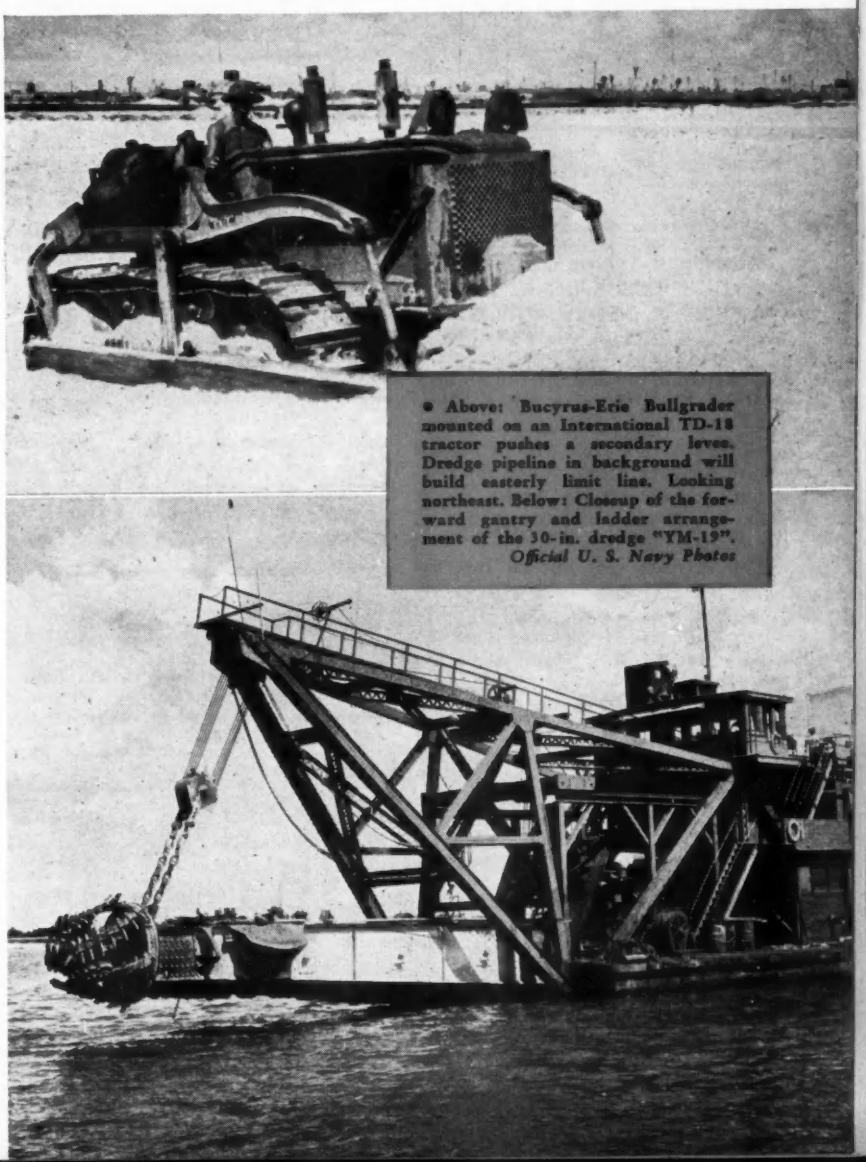
When the "Tualatin" (YM-19) was floated out of the drydock, she was towed in and set up for the first cut on the shoreward end of the job, as had already been planned by the officers who had been here before. Her digging spud went down in 17 feet of water on the starting position of Cut No. 1.

The dredging commenced a considerable distance toward the sea from the shore of the island. This operation was efficiently designed to serve two purposes. First, it would hasten the time necessary to dredge the 300-foot wide approach channel and turning basin. Second, the 400,000 cu. yds. of coral which were scattered over an area of 801,500 square feet could be dumped to make a new land jetty, 1000 feet long by 600 feet wide, which would extend the old shoreline out into the bay. The end of this fill was only 60 feet from the shoreward dredging limit line. Project depth, referred to mean low tide, was minus 27 feet. Due to the irregular shape of the lagoon, varying winds and weather, maximum tidal fluctuations of from zero to plus 7 were noticed.

Approximately six feet of water lay over the proposed dump ground. In order to build the new land, the planners had decided to form the boundary lines with the pipeline, building a hydraulic levee completely around the area. After the preliminary levee was built, the center could then be pumped full. The scheme was incorporated in the written orders relayed to the dredge captain.

Twin pipelines were carried from the shoreward end of the dump out toward deep water. One line was carried 30 feet outside and parallel to the fill limit line; the other was 30 feet inside. The material averaged 71% coral sand, 18% finger coral, and 11% hard coral. It stood on an average slope of 42 to 1.

After tracing the westerly limit, an elbow was installed which filled in the seaward end of the fill. The easterly dump limit was pumped at the same



● Above: Bucyrus-Erie Bullgrader mounted on an International TD-18 tractor pushes a secondary levee. Dredge pipeline in background will build easterly limit line. Looking northeast. Below: Closeup of the forward gantry and ladder arrangement of the 30-in. dredge "YM-19". *Official U. S. Navy Photos*

• Seabees on a Caterpillar D-7 side crane place a 20-foot section of shore pipe on the right side of the Y-valve and LaPlant-Choate 'dozers push in a coral foundation.
Official U. S. Navy Photo

time the seaward leg was being finished.

Marines Co-operate

Probably no job has ever been done in this war without a certain amount of "procuring". Also, it is completely safe to say that of all the forces in this war, the two who love each other and cooperate the best are the Seabees and the U. S. Marine Corps. They have worked and fought together until they have a great deal of mutual regard for each other. When the Battalion's dump tractor broke down, then, it was only natural to turn to the Marines for help.

The Marines sent out an International TD-18 tractor with a Bucyrus-Erie hydraulically controlled bulldozer blade. A TD-14, also equipped with a Bucyrus-Erie blade, came out also. Both machines had Marine drivers, anxious to work on the Seabee job, mostly because the Seabees served excellent meals at noon. The machines were used to erect a secondary levee three feet above the initial dump, which had previously been filled in to plus 10. When the central part of the fill was started, water was trained northward. By cutting a small spillway through a causeway with one of the Bullgraders, an unsightly rubbish dump was largely covered with fine particles.

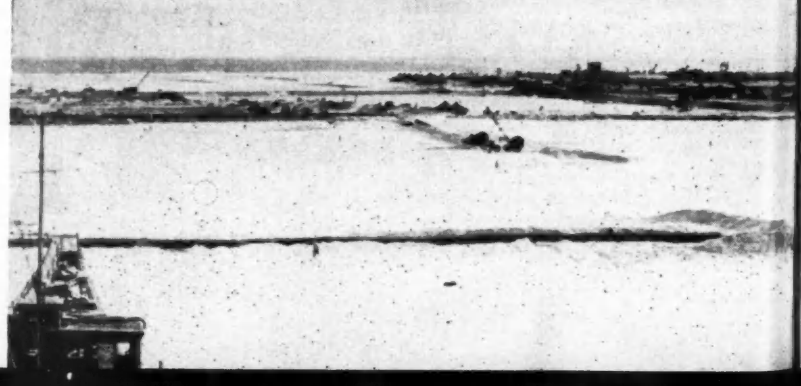
A main spillway was cut through by a Northwest Model 6 dragline at a floor elevation of plus 5. The spillway structure was made in the form of a covered flume and set in the excavation. When it was backfilled, traffic continued to flow smoothly over the top, while clear water drained off the dredge pool to return through the flume to the Pacific Ocean at the north side of the island.

A six-blade cone type cutter, with seven teeth on each blade, was used throughout the project. Spare cone type cutters and an open basket type blade were brought along, but the daily yardage output was sufficient so that no change in blades was indicated.

Shells Cause Trouble

Probings made with a four-inch water jet prior to dredging, however, indicated that there was some trouble ahead. These probings showed some very hard coral heads, and they were found as predicted. Huge clam shells, 24 inches across, were cemented in the coral heads. Dislodging these shells and keeping them from hanging in the pump caused a great deal of work. For about a week, delays of three to four hours in each 24-hour working day were not uncommon, all from this single cause. The pump was then opened up and curved sections were burned out of each of the four vanes of the pump impeller. This extra opening let most of the shells pass. It was not necessary to blast in the area, although 2000 cases of 60% Hercules gelatin were brought along. Pump de-

• This view shows how the fill was closed by pumping a levee all around the area. Later, the central section was filled in.
Official U. S. Navy Photo



lays dropped down to about 30 minutes after the alteration was made.

An average vacuum of 18 inches with a pipeline pressure of 65 pounds per square inch was maintained. Twenty-nine days after the YM-19 started to dig she was ready to move ahead to other work.

The floating pipeline was fitted with both Plummer and Fort Peck type joints. About 40% of the latter type were used. Floating elbows, mounted horizontally between pontoons, were used behind the dredge. Slack was built in the line and taken up by each pipeline joint rather than in the suspended swivel elbow which has been developed and used successfully on the Great Lakes.

The importance of servicing and maintaining all auxiliary equipment in good condition was constantly stressed. In addition to the machine shop aboard the YM-19, repairs were also made in the dredge yard ashore. Cable slings were spliced aboard the dredge.

The YM-19 usually operates on one boiler, but when maximum power is needed and material must be moved great distances, an auxiliary boiler is available. Except for the cutter, she is steam driven. Her 30-inch pump is turbine operated through a gear reduction box, with a maximum of 5700 horsepower available. Her cutter is driven by a General Electric induction motor, which obtains its power from a 2500 kw steam driven generator. Power is fed to the cutter motor by a three-phase current at 2300 volts.

The dredge's port and starboard spud and swinging engines are steam reciprocating. She makes her own fresh water for boilers, cooking, bathing and drinking purposes. Her condensers allow about 90% of the boiler feed water used in making steam to be recovered.

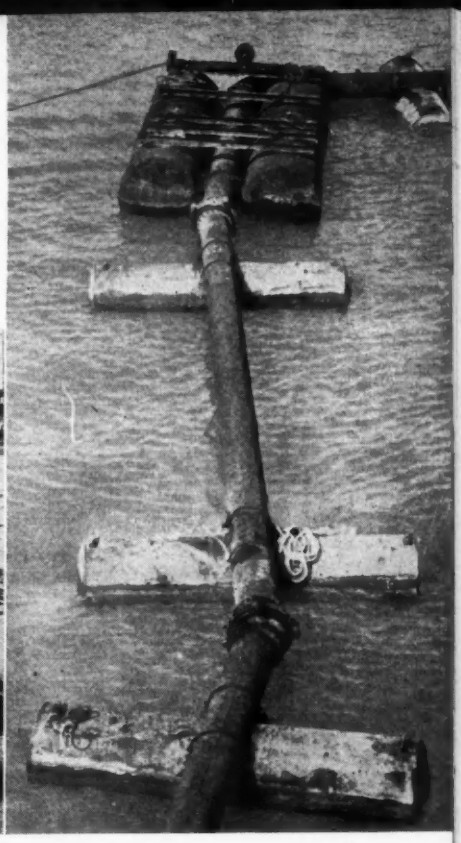
The especially heavy forward gantry and ladder frame. The dredge cutter ladder assembly weighs 105 tons.

Several big coral heads were left on the seaward end of the approach channel, but since there was ample depth east of the obstructions they were not regarded seriously. They covered an area of 33,000 sq. ft., with a volumetric content of 14,100 cu. yds.

Operating Statistics

Some conclusions regarding the size and the manner in which the Seabees did their first dredging job can be obtained from the following statistics on the finished project:

• **Below: A Seabee welds heavy rings on the inside of this basket-type cutter to keep rocks from entering the pump. This cutter, however, was not used. Right: Here is the 30-inch pipeline, showing Fort Peck joints, pontoons, corner elbow, and method of anchoring the floating line.** ***Official U. S. Navy Photos***



Total gross yardage dug	385,680 c.y.
Total pay yardage dug	365,320 c.y.
Total effective digging time	478 hrs.
Total non-effective time	242 hrs.
Total time (digging)	66.3%
Total time (idle)	33.7%
Amount dug per operating hour	807 c.y.
Average pump speed	244 r.p.m.
Total fuel oil used	414,120 gals.
Fuel used per cubic yard	1.07 gals.
Number of setups made	6

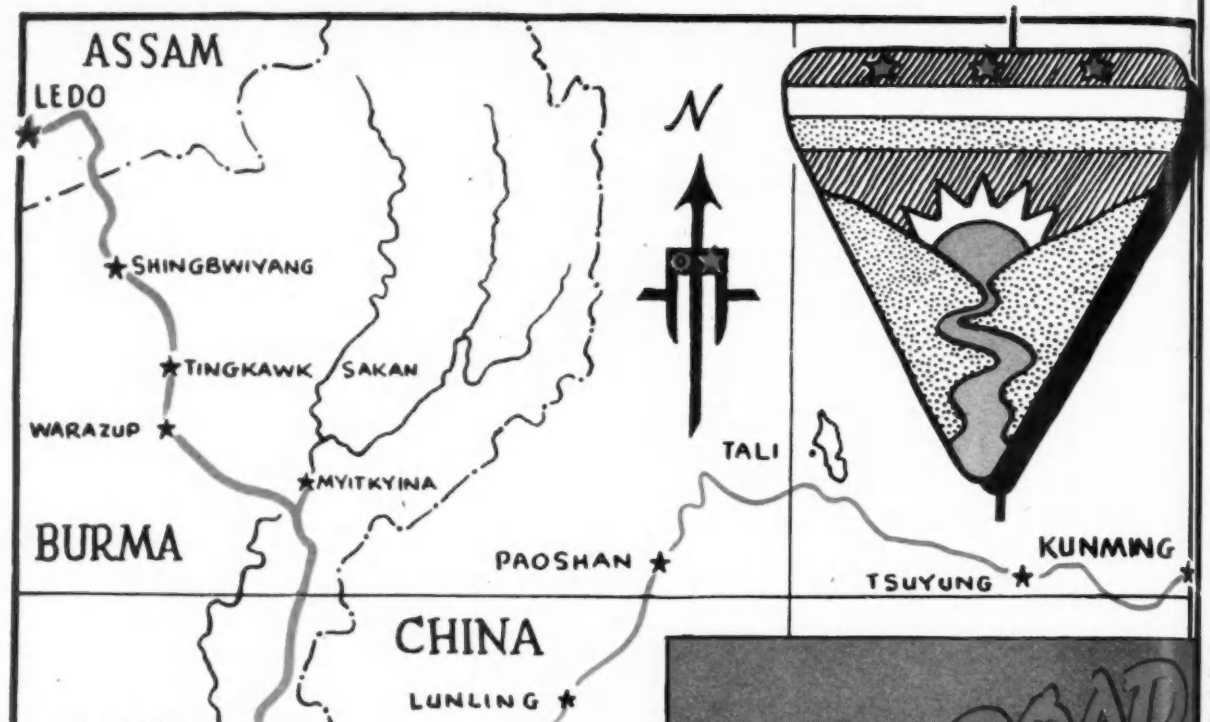
Following is a breakdown of non-effective time:

Non-effective Time

Handling pipeline	25:10 hrs.
Handling swinging lines	15:05 hrs.
Clearing pump and pipeline	28:55 hrs.
Clearing cutter and suction head	2:25 hrs.
Changing location of dredge on job	43:10 hrs.
Waiting for vessels to pass	:20 hrs.
Minor operating repairs	53:30 hrs.
Preparation	10:15 hrs.
Miscellaneous	3:00 hrs.
Major repairs to cutter motor	39:00 hrs.
Out of commission	21:20 hrs.
Total non-effective time	242:00 hrs.

This U. S. Naval Construction Battalion boasts the distinction of being the only completely seagoing battalion ever formed. Its specialty of marine construction is also well established. Heading this group of dredgemen, surveyors, powdermen, divers and piledriver men is Commander F. G. Elliot, CEC, USNR, with Lieut. Commander C. E. McKay, CEC, USNR, in charge of planning as executive officer of the battalion.

• **A view of the 30-inch pipeline taken on the middle of the fill.**
Official U. S. Navy Photo



Using modern American equipment, American Engineers accomplish the "impossible" by completing in 15 months a modern permanent allweather highway 478 miles through the toughest terrain in the world to establish a lifeline from India to sustain our valient Chinese Allies in their fight against Jap aggression.

WHEN BURMA was invaded by the Japs early in 1942, the Burma Road, last route to China's valient armies, was sealed off and future Allied supplies and assistance overland awaited ambitious military plans and executions.

The British started work on a route from Ledo, a small bazaar in Assam, India, in a general direction of Fort Hertz in February, 1942. A second route stemming from Ledo up over the Patkai Mountains and down through the Hukawng and Mogaung Valleys of Northern Burma had been surveyed several years before. In 1942 this was planned only as a "Jeep" route, but today it is the route which has become known as the Ledo Road for in April, 1942 the British stopped work on the truck route to Fort Hertz and it was decided that future Allied road-building efforts would be concentrated on the route of the Ledo Road.

In October, 1942, General Joseph W. Stilwell and Field Marshall Lord Wavell (then General Wavell) met and decided that the construction of the Ledo Road would be an American responsibility, subject to the approval of Generalissimo Chiang Kai-shek, from whom it would be necessary to obtain the release of Lend-Lease stores of road building equipment which could not be moved into China.

Subsequently, American army officials met in Delhi and drew up plans for the Ledo Road project which were submitted to General Stilwell on November 5, 1942. These plans were indefinite but it was generally accepted that the route of the road would roughly follow an ancient Naga route between Burma and India across the Patkai Mountains.

On December 1, 1942, the advance contingent of American troops arrived in Ledo and went to work on the road with British Engineers, who had, by that time, cut the road to a point which is now Mile 0.00 on the Ledo Road. On December 10, 1942, the road officially became an American project.

Tea plantations and matted, virgin jungle were turned into the bivouac areas by the first detachment of colored American engineers to arrive in Ledo.

Amount of Earth Moved

Almost unbelievable quantities of earth had to be moved in order to

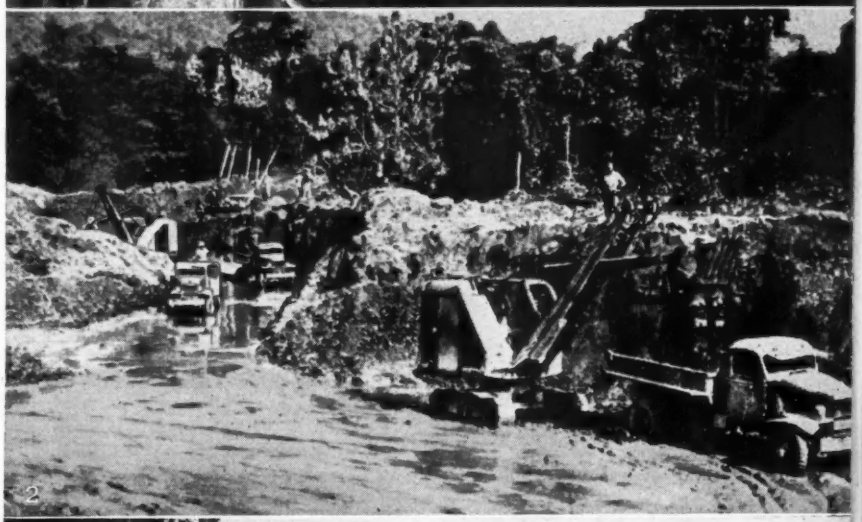
push the Ledo Road through the 270 miles of virgin jungle to the junction with the Bhamo Road and to handle drainage, train load after train load of culvert pipe had to be moved into Ledo and then down the Road to the points at which it was used.

Through the 102 miles of mountain section where the minimum shoulder to shoulder width of the Road is 33 feet, 100,000 cu. yds. of dirt were moved for each mile of road constructed. In the valley, where 49 feet is the minimum shoulder to shoulder width, 25,000 cu. yds. were moved per mile.

In round figures, an average of 50,000 cu. yds. of earth were moved for each completed mile of the Ledo Road, which is a total of roughly 13,500,000 cu. yds. With this amount of dirt, it would be possible to build a solid wall three feet wide and ten feet high in a straight line from New York to San Francisco.

The earth over which the Ledo Road passes is a sandy loam that whips into liquid mud which requires a heavy surfacing coat to withstand the pounding of convoys. Such rock as was available in the mountain sections has shale-like properties and soon grinds into a powder if used for a surfacing material. Therefore, gravel deposits in the rivers along the Ledo Road furnished the only source of surfacing material. Recovering gravel from the streams, along with the haul and spreading, constituted a major accomplishment in itself. It was sometimes necessary to transport gravel as far as 25 to 30 miles.

In the 102 miles of mountain section, gravel was placed 12 inches deep over a 20-foot section, amounting to about 3,865 cu. yds. of gravel per mile for the initial coverage. About 1,920



1. American Negro Engineers eat supper in truck on Ledo Road. Boom of Bucyrus-Erie 15-B crane is in background.
Signal Corps Photo

2. Osgood (foreground) and Bucyrus-Erie power shovels load trucks with sand to be used in making surfacing material for the Ledo Road.
O.W.I. Photo

3. Survey party on elephants passes a LeTourneau bulldozer somewhere on the Ledo Road in the jungles of North Burma.
Signal Corps Photo

4. Mud was one of the big obstacles in the construction of the Road. Bucyrus-Erie 15-B crane is on extreme left.
Signal Corps Photo

• Through jungles, up mountains, across rivers and swamps, U. S. Army Engineers constructed the Ledo Road as Allied fighting men cleared the enemy along the route.
Signal Corps Photo

• After descending on a landing strip along the Road this L-4 (cub) liaison U. S. Army plane is being hidden among the bamboo trees beside the strip by a line crew.
U. S. Army Air Forces

more cu. yds. of gravel were required for each mile to take care of settlement, shrinkage, wash and initial patching. A total of 5,785 cu. yds. of gravel were used per mile.

On the 265 miles of virgin road through the valley and on the 98 miles of road from Bhamo to the junction with the Burma Road, eight inches of gravel were spread over a 20-foot section, or about 2,580 cu. yds. to the mile. The initial maintenance here required an additional 860 cu. yds. of gravel per mile for a total of 3,440 cu. yds. for each mile of road.

River Crossing Problems

River crossings presented seemingly unsurmountable barriers to the completion of the Road. The Ledo Road crosses 10 major rivers between Ledo and the junction with the Burma Road. Not considering the numerous minor drainage lines and small creeks which had to be contended with, and, in addition to the major rivers, approximately 155 secondary streams had to be bridged. There is a bridge crossing either a major or a secondary river for about every three miles of road constructed. There are in all about 165 main bridges on the Ledo Road, exclusive of the crossings over minor drainage lines. Total overall length of these bridges is about five miles.

At the Irrawaddy River, one of the longest pontoon bridges on record was placed to supply the forward operations until the permanent bridge could be constructed. The permanent bridge has to be a specially designed floating bridge as the Irrawaddy is 60 feet deep at the crossing and fluctuates 45 feet between high and low river stages.

Lumbering and logging operations followed the road point as it pushed south to meet the Burma Road. Demands for forest products in the form of piling, bridge timbers, planking and lumber for the construction of subdepots along the route reached proportions almost beyond imagination.

In an effort to make as much progress as possible before the onset of the monsoon, access roads and maintenance operations were discarded as the engineers pushed one road head on up into the mountains.

Use Indian Laborers

When a critical shortage of heavy equipment threatened to impede progress of the road trace, Indian laborers were imported in large numbers and they cleared the new trace by hand. Although their labor accomplished a useful purpose, it was never wholly satisfactory.

On February 26, 1943, the lead bulldozer crossed over Pangsau Pass into Burma—Mile 38.50 of the new trace. By the end of March, the lead bulldozer, operated by fuel carried up to the point by porters, was at Mile 47.30. The road advanced to Mile 42.50 before work bogged down with the onslaught of the monsoon. Engineers at the point underwent untold hardships during the rains. Men were wet all of the time. The soggy jungles were infested with long, purplish leeches, the bites of which festered. Dozers were lost over steep banks when rain-saturated trace shelves collapsed. Dozers were buried in slides and stalled in seemingly bottomless mud.

General Pick Assumes Command

When Brig. General Lewis A. Pick assumed command of the Ledo Road Project on October 13, 1943, progress on the road seemed hopelessly stalled in a maze of densely jungled, precipitous mountains. Eighty per cent of the engineering camp at the point was hospitalized with malaria. Crews were working but one eight-hour shift.

General Pick, who had been called from his command of a vast construction program being carried on by the Missouri River Division and his work with the Missouri Valley Flood Con-

trol to assume command of the Ledo Road Project, held a staff meeting his first evening in Ledo.

"I've heard the same story all the way from the states. It's always the same—the Ledo Road can't be built. Too much mud, too much rain, too much malaria," he told his staff. "From now on we're forgetting this defeatist spirit. The Ledo Road is going to be built, mud and rain and malaria be damned!"

On November 3, 1943, Stilwell paid a visit to General Pick and at the time was told that the road to Shingbwiyang, 54 miles from Ledo, would be completed by the first of the year. On the morning of December 27, 1943, the lead bulldozer broke the tape at Shingbwiyang in Burma's Hukawng Valley, and the engineers had conquered the Patkais four days ahead of schedule. A convoy of 55 trucks carrying Chinese combat troops and equipment followed the lead bulldozer into Shingbwiyang, marking the first Allied troops to be brought into North Burma by vehicle.

The engineers had cut 54 miles of trace through the roughest terrain in the world in 57 days.

The opening of the Road through the Patkais provided a route for General Stilwell's combined Chinese-American combat forces to enter North Burma in strength. During January, Chinese units moved up from India to the front, and in February Brig. Gen. Frank Merrill's famed Marauders made their famous ten-day march over the mountains and started their now-legendary assault on the Japanese invincibility myth.

Clear Combat Roads

To make this Allied offensive possible, General Pick diverted a large percentage of his engineers from work on the Ledo Road trace to clear a combat road through the jungle to the front over which troops, supplies, tanks and equipment could move. Engineers, working on armor-plated bulldozers, went in advance of the infantry, cutting a trace which eventually led through the jungle to battlefields at Ningam Sakan, Taipha Ga, Maingkwan, Walawbum, Tingkawk Sakan, Jambu Bum Pass, Shaduzup and Warazup.

As the tide of battle swept on into North Burma, engineers pushed the Ledo Road trace on down the Hukawng Valley. Although at several points the lead bulldozer was held up by the combat situation, progress was rapid.

The lead bulldozer averaged better than a mile a day. Chinese engineers built bridges of hand-hewn timber over the many streams which the road crossed. These bridges, all intended as temporary crossings, were later replaced by H-20 and Bailey steel bridges.

As the point moved forward, other engineer units were at work in the Patkais eliminating bad curves, making new fills and setting up a road drainage system.

New Equipment Received

The Road had progressed to Warazup (Mile 189.20) when the 1944 monsoon struck holding up further progress of the point. Save for occasional road blocks, the road was kept open during the rains and the first sizable shipments of heavy equipment to arrive in Ledo from the States were moved up the road during the monsoon. Thus, the end of the monsoon in October found a vast backlog of new bulldozers, trucks, cranes, shovels, scrapers, rock crushers, culvert, bridge sections and all the myriad vital engineering equipment which goes into the construction of a highway poised at Warazup ready for the drive down the home stretch.

Meantime the Japs were being driven further back south into Burma and, after a 74-day siege, the vital Irrawaddy River bastion fell to combined American-Chinese forces.

Although the rains halted the lead bulldozers, survey crews continued to probe through the matted jungles, across swamplands, and over the low rolling hills that fringe the Mogaung and Irrawaddy River Valleys, surveying the route laid out by General Pick.

And during the rains, engineers completed the biggest job of maintenance engineering in the history of the Corps of Engineers, the construction of a two-mile wooden causeway over a stretch of flooded jungle land.

At the end of the monsoon, all the crack engineering units on the Ledo Road began the new trace. Chinese engineers built a corduroy access road across 10 miles of swampland south of Warazup and up into the foothills. The rough access road then followed the proposed route along the hillsides and down into Namti, a station on the Rangoon - Mandalay - Myitkyina rail-

(Continued on page 228)

• Right: Assembly in Ledo, Assam, of the first truck convoy in the past two and one-half years with supplies for China. Many vehicles, in addition to carrying a wide variety of supplies and ammunition, are pulling anti-tank guns and field artillery pieces for the Chinese army. Destination is Kunming, China—via Myitkyina, Burma, on the Burma Road—about 1,000 miles. Below: A convoy from a Chinese division winds along through the jungles on the Ledo Road in Burma carrying supplies for the bulldozers at the head of the Road. Very dusty in the dry season, the Road becomes extremely slippery during the monsoon season.
U. S. Army Air Forces Photos

U. S. Engineers Redistribute Used Materia

By L. H. HOUCK

Army Engineers use five cranes, four crawler and one railroad, at New Orleans Engineer Redistribution Center to unload, store and re-load for further use material and equipment from battlefields all over the world. Center also used as depository for finished materials of contractors with terminated contracts.

EXPECTING THE UNEXPECTED is the theme of the large materiels handling operations of the New Orleans Engineer Redistribution Center, a new project of the United States Army Engineers.

And it gets what it expects — any morning might bring a carefully packaged instrument via parcel post or a three million pound load containing anything from tractors to barbed wire. Usable materiel is shipped to this center from off-shore bases so that it may act as a clearing house and ship it to where it is most needed.

Behind the shot and shell and the tumult and shouting of war is engineering—and before it, too, because it takes the United States Army Engineers and their equipment to pave the way for military victories.

After the smoke of battle has cleared and the sounds of firing have died down, there remains on the beach, or battlefield, much good, usable and costly material and equipment. The United States Army Engineers are picking this up and sending it back to the United States where it is cataloged and readied for shipment to other war fronts.

The New Orleans Engineer Redistribution Center is an expansion of what used to be a materials depot under the jurisdiction of the New Orleans District, United States Engineers. It was started in August, 1944, and Captain W. H. G. Roth, United States Engineer Officer, was sent to take charge of it in September. The Center is under the jurisdiction of the Mobile District of the United States Engineers in charge of Lt. Colonel H. I. Collins, District Engineer.

The Center does not do salvage work in the sense of rehabilitating damaged equipment. It repairs its own working equipment, but handles stores, and keeps ready for use and shipment only material and machinery that is ready for use when received. Salvage, as such, is handled by the Engineers in a different manner.

Located at a seaport, it receives shiploads of materiel and ships out in like manner. It keeps ships loaded coming and going. An average shipment by steamer will contain from two to three million pounds and the Engineers at the Center never know what's in the shipment until they unload it. Some steamers are unloaded at Mobile, Alabama, and the materiel sent to the Center by rail in order to release the steamer.

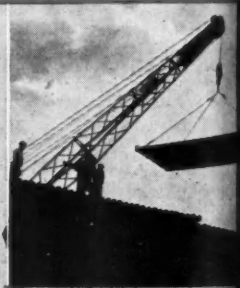
It is no small task to check the materiel as it arrives and to catalog its technical details. While war exigencies do not permit publication of a detailed description of the operation of this Center, it is permissible to state that it is conceivable for a shipment of materiel consisting of tractors, nuts, bolts, steel pipe, draglines and road pavers to arrive from a port in Africa. The Redistribution Center would unload, check and store this materiel, and depending on orders on hand, might at the same time start loading part or all of the shipment to a ship bound for the Pacific.

It takes five cranes in the yard to keep the materiel moving in an orderly manner. In addition to cars to be unloaded, boxes to be moved and shipments to go out, there is ground to be leveled and drainage ditches to be dug.

A Bucyrus-Erie 44-B dragline that came to the Center equipped with a 2-cu. yd. bucket is used as a crane and now spends most of its time handling wood piling. The crane has a 50-ft. boom and is powered with a Buda Lanova diesel engine. The mobility from its crawler mounting permits it to get around the railroad cars and material piles and it is narrow enough to work in limited aisle space.

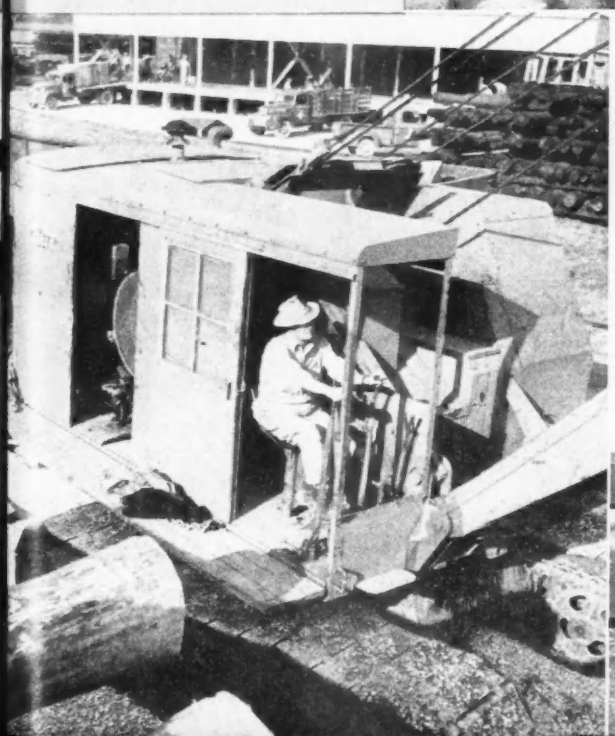
Special gadgets are the order of the day and seldom does a day pass that changes in type of materiel handled

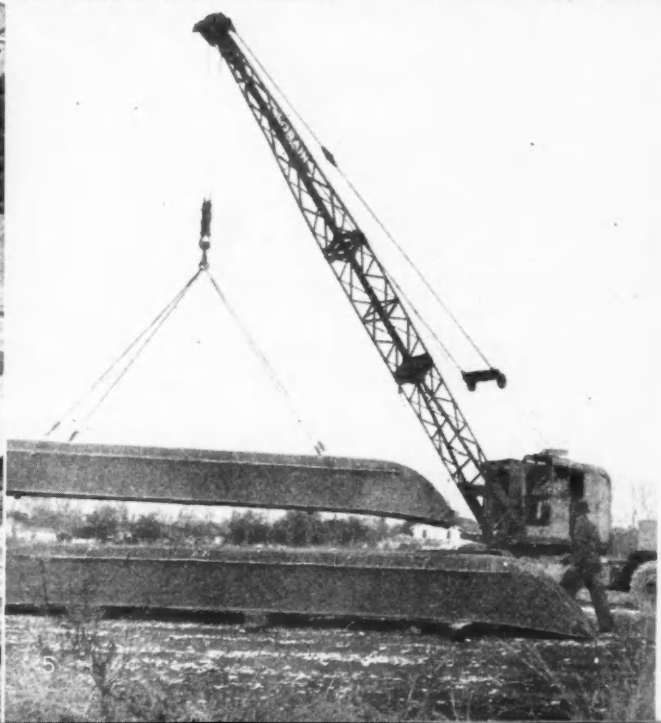
(Continued on page 225)



• Special sling is rigged to Bucyrus-Erie 44-B crane for big pipe handling job. Left: Two lengths of steel bar with 15 projecting lugs on each were attached to crane hook by four cable slings. Above: Hollow ends of pipe fitted over lugs enables crane to handle 15 lengths of pipe at a time. Right: Its mobility allows this B-E to get around railroad cars and material piles and it is narrow enough to work in limited aisle space as shown here.

• 1. Link-Belt 1½-cu. yd. crawler crane with 50-ft. boom used for general utility work loading and unloading heavy material.
2. Bucyrus-Erie 2-cu. yd. crane with 50-ft. boom is used here to handle steel pipe. Its principal use, however, is to handle wood piling.
3. Captain W. H. G. Roth, engineer in charge of the Center, discusses material handling with Paul L. Smith, civilian, yard superintendent.
4. Northwest Model 8 with 75-ft. boom is used for jobs requiring a long reach. The crane pictured has her hook in steel.
5. Lorain ¾-cu. yd. Motocrane with 40-ft. boom, mounted on ten-wheel tandem drive truck, is used where short jobs are spotted long distances apart. It is shown here stacking boats.





Field NOTES

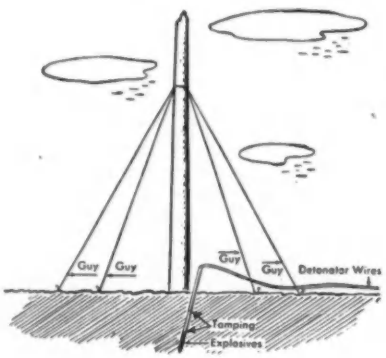
Pole Setting with Dynamite

Line construction engineers and their foremen frequently meet the obviously difficult job of excavating in mucky swamps or quick sands for pole placement.

Fair success in setting small poles can be attained by sinking a barrel with both ends removed. Earth is shoveled from the barrel. A second barrel placed on top of and fastened to the first insures getting sufficient depth with this method.

The barrel method is hardly feasible to set large poles for "Class 1" construction, but larger poles can be placed very effectively in soft or loose materials with the use of explosives.

To use the explosive method, the pole is lifted into position in the usual manner and then four guide ropes are used to hold it perpendicular. With the pole in position, a dynamite loading tube is driven into the soil at a slight angle until its point is as nearly



as possible under the center of the pole butt. In that position the force of the explosion will be directly upward in the correct spot. It will force out the earth in all directions to permit the pole butt to fall into place during the split second that the hole is open. It is important to get the charge at the proper depth and directly under the pole butt to insure alignment.

Since most readily available explosives are 1⅛ inches in diameter, any reasonably good piece of scrap pipe or conduit measuring from 1½ to 2 inches in diameter will serve nicely as a drive point and loading tube. Where sand and muck free from rocks and roots are encountered, ordinary thin-wall conduit scrap, straight and water tight, will serve. For heavier going where obstructions may be met, water pipe or standard conduit (rigid) is recommended. One end of the pipe or conduit is beaten to a point to help it drive easily with a post maul.

A suggested type of explosive is 40% (straight) or nitroglycerine dynamite, also known as ditching dynamite. Its action is fast and effective as compared with the average type of dynamite. Fairly good results can be secured by using 60% gelatine dynamite.

An electrical No. 6 detonator is a suggested method of exploding the charge. The best means of confining the expanding gases of the explosion to the base of the tube is by tamping the charge with approximately 18 inches of wet clay or, perhaps, paper.

The following list of quantities can serve as a guide for the amount of charge to be used, although conditions vary broadly and no specific rule applies in any instance.

	No. of Cartridges	Strength
Swamp Muck	2½	40%
Swamp Muck and Boulders	3	40%
Quick Sand	3½	40%
Gravel, loose rock	4-6	40%

By Phil Glanzer

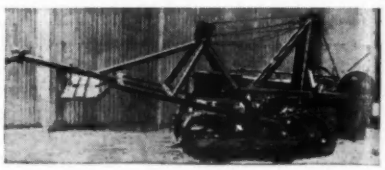
Welded Ore Driller

Unique in welded fabrication is a tractor mounted rock and ore driller, built by Galena Machine & Electric Co. of Kansas.

In building the "Jumbo", as it is named, the internal combustion was removed from the engine and an air head with four slide valves substituted. The crankshaft was cut at the center bearing and one-half of it given a quarter turn, then welded back together, straightened and refinished to place the throw of the shaft 90° around center.

The cam shaft, driven by sprockets and chain, admits air to the cylinders when the pistons are at the top or the stroke.

The boom is constructed of three-inch extra strong pipe, one end pivoted to a three-inch double extra strong pipe by means of 2¼" pins fastened with set screw in each end of the three-inch pipe. This double extra strong pipe replaces the spring in front of the tractor and supports the engine. At the other end of the boom a three-inch extra strong pipe eight feet long is fastened in two clamps at the end of the boom and two rock drills are mounted on this plate. The drill operators stand on the



platform hinged to the bottom at the back and supported in front by an adjustable chain to keep the platform level.

An air-driven winch is built from a Model-A block assembly in the same manner as the engine. The winch drum is mounted above the engine and both are contained in an arc welded three-inch angle iron frame. The cable from the winch goes to the derrick and through three-sheave fall blocks on both the derrick and boom. On one side of the tractor just above the tracks is an air receiver fabricated of eight-inch pipe, five feet long with pipe couplings welded on, from which air is taken to run the winch, tractor motors and the two rock drills.

The equipment is driven to the ore face, the boom is raised and a row of holes drilled, lowered twice more for other rows of holes, then driven to another "set-up" and the process repeated. It is reported two drillers can do the work of six using the old post or tripod method.

By The Hobart Brothers Co.

IDEAS THAT PAY

You, like others, devised "kinks" or ideas that cut costs, increased production, saved manpower, or made jobs easier. Why not share them with others and also benefit from their ideas? Let's have 'em! Just the facts will do and, if possible a rough sketch or photo. We'll be glad to send you a minimum of $5.00 for each item we publish—and, of course, give you full credit.

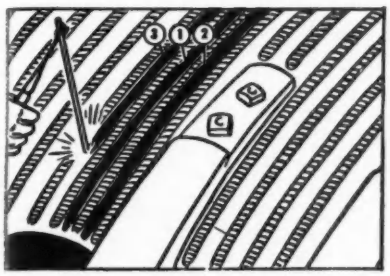
Send your idea to:
Field Notes Editor
EXCAVATING ENGINEER
South Milwaukee, Wis.

Stringer Beads Increase Bucket Life

There have been arguments during the past several years as to which of several methods was best for hard-facing dragline buckets, power shovel dippers and shovel teeth. Controversy still exists, but a recent survey indicates that one method, with minor variations, is now predominant, and is generally accepted as being the most economic and efficient.

This method consists of applying a series of stringer beads to the part to be hard-faced. Beads are usually spaced from ½ to 1½ inches apart. If fairly large rock is to be handled, beads are applied parallel with the

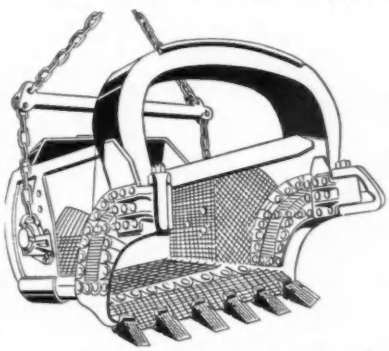
flow of material, the beads from runners or skids that keep the material from contact with the manganese base metal. Slight wear will occur between stringer beads, but depth of wear rarely exceeds ⅛-inch. As the original stringers begin to wear, common practice is to apply additional stringers between the original beads (Fig. 1). These new beads bring the parent metal back to original and equalized



• Fig. 1—New stringers applied alternately between original beads.

height over the entire dipper surface. This hard-facing operation, if continued, will prolong dipper life indefinitely.

When the material handled is soft and easily handled, intersecting beads with a checkerboard pattern are applied (Fig. 2). The intersecting beads fill with earth and the fresh earth slides over it without actually contacting the base metal. Dragline buckets and power shovel dippers

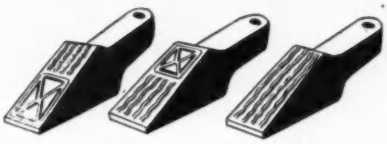


• Fig. 2—Hard facing like this often results in five times longer wear.

faced in this manner often last three to five times longer than those not hard-faced.

Aside from speed of application, the stringer bead method is more economical than solid deposits of weld rod. Stringer beads also eliminate danger of overheating manganese castings and destroying grain structure.

The proper method of application is to begin at the center of the bucket and apply alternate beads to right and left. Do not oscillate rods during the welding operation and hold amperage down to a minimum to



• Fig. 3—Variations in dipper teeth hard facing patterns.

avoid overheating and to obtain a fairly high bead. Bare electric rods tend to form a higher bead and are preferable to coated rods.

The stringer bead method also is widely used for hard facing shovel teeth. Figure 3 shows pattern variations commonly employed with equally good results.

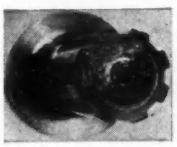
From Fusion Facts

Rock Drills Last Longer With Proper Care

Although a rock drill must be extremely durable and sturdy for very hard work, it is built with the same precision that characterizes the making of a fine watch. The piston of a rock drill strikes 1800 to 2200 hard blows a minute against a drill steel shank. In order to stand up against such punishment, special attention must be devoted to materials, machining, and heat treating. The average drifter piston, for instance, is allowed approximately 55 hours to make, yet, despite the care taken in producing this fine piece of workmanship, it can be spalled or broken through careless, improper operation.

When you receive a new hammer, be sure it has a full supply of the proper type of oil in its reservoir. The airline lubricators also should be filled with a good grade of rock drill oil. Blow dirt or any other particles free from the air hose. A wise precaution at all times is keeping the air free from the moisture which washes away lubricant by using intercoolers, aftercoolers, and water traps.

Your operator should be instructed in the fundamentals of good rock drill operation with emphasis placed on keeping the machine in line with the drill steel. Drills out of line wear chuck bushings rapidly to cause the piston to strike the corner of the drill



• Fig. 1 — Piston spalled on striking face. Do not use shanks that are not ground square.

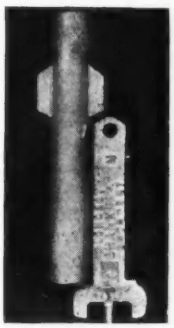
steel and incur spalling. (Fig. 1.)

Watch high air pressure which breaks rock drill parts and low pressure that damages stopping drills since it will not hold them up to the work. Water pressure greater than air pressure drives water into the drill mechanism and may wash away the lubricant.

When drilling in moist ground use a wet machine to prevent plugging of the bit and also to prevent "mud collars" which often stick the steel. Holes drilled by dry hand-held sinkers should be blown frequently to keep the bit from binding.

Dull bits lower drilling efficiency, put strain upon the wings of the bit and are the most frequent cause of bit breakage. Keep them well sharpened.

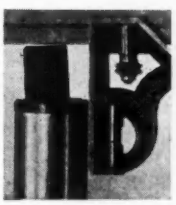
Drill shanks that are too long or too short should be avoided (fig. 2). Short shanks reduce the force of the strikes



• Fig. 2 — Drill shanks too long or too short result in loss of striking power.

while long shanks short-stroke the machine for a loss in the power of the blow.

An excessively worn cylinder front washer destroys the cushion at the front end of the machine and causes breakage of fronthead parts and pistons. Worn chuck bushings prevent pistons from striking squarely on the shank of the drill steel and result in spalling or fracture. Figure 3 shows a shank set in a worn chuck bushing, sometimes due to too small drill-steel shanks, or machinery not in line with the drilled hole. Any worn work-



• Fig. 3 — Worn chuck bushings cause play in the drill shank.

ing part in the drill should be given immediate attention.

Much scoring can be prevented with a lubricator that atomizes oil into the air line. The oil used in sinkers, stoppers, drifters and paving breakers should be well refined petroleum oil, petroleum oil compounded with animal oil, or a free flowing liquid grease which will not separate upon standing.

Keep an ample supply of sharpened steel on hand. Detachable bits eliminate the need for hauling large quan-

(Continued on page 226)

Shots from the FIRING LINE

Site Labor Accounts for 26% of Road Program

About 26 per cent of the annual expenditures under the postwar Federal-Aid Highway program will be for labor at the construction sites, according to statistics released today by the Associated General Contractors of America, the national trade association of leading construction contractors.

Under the three-year postwar program, $500,000,000 in federal funds is apportioned among the States each year on a 50-50 matching basis, thus providing approximately $1,000,000,000 annually for the national program.

One of the chief purposes of the highway program is to provide postwar employment, and according to the AGC the program will provide annually 95,750 man-years of direct on-site labor, and 215,600 man-years of indirect off-site labor, based on 1940 prices.

As to the spread of business activity resulting from this highway program, AGC reports that business transactions involved in handling and processing materials and equipment used in road construction approximates three times the total highway expenditure — which would mean about $3,000,000,000 each year during the three-year program.

Expenditures for materials per year under the program would total about $443,000,000, or about 44 per cent of the cost of the annual program, the AGC statistics show.

Report Production of 34,066 Crawler Tractors

Production of tracklaying tractors in 1944 amounted to 34,066 units, with a dollar value of approximately $300,000,000, War Production Board officials informed the Tracklaying Tractor Industry Advisory Committee at its recent meeting. The production figure does not include output of the military plant at Berwick, Pa., or of one small company chiefly making crawler-type farm tractors.

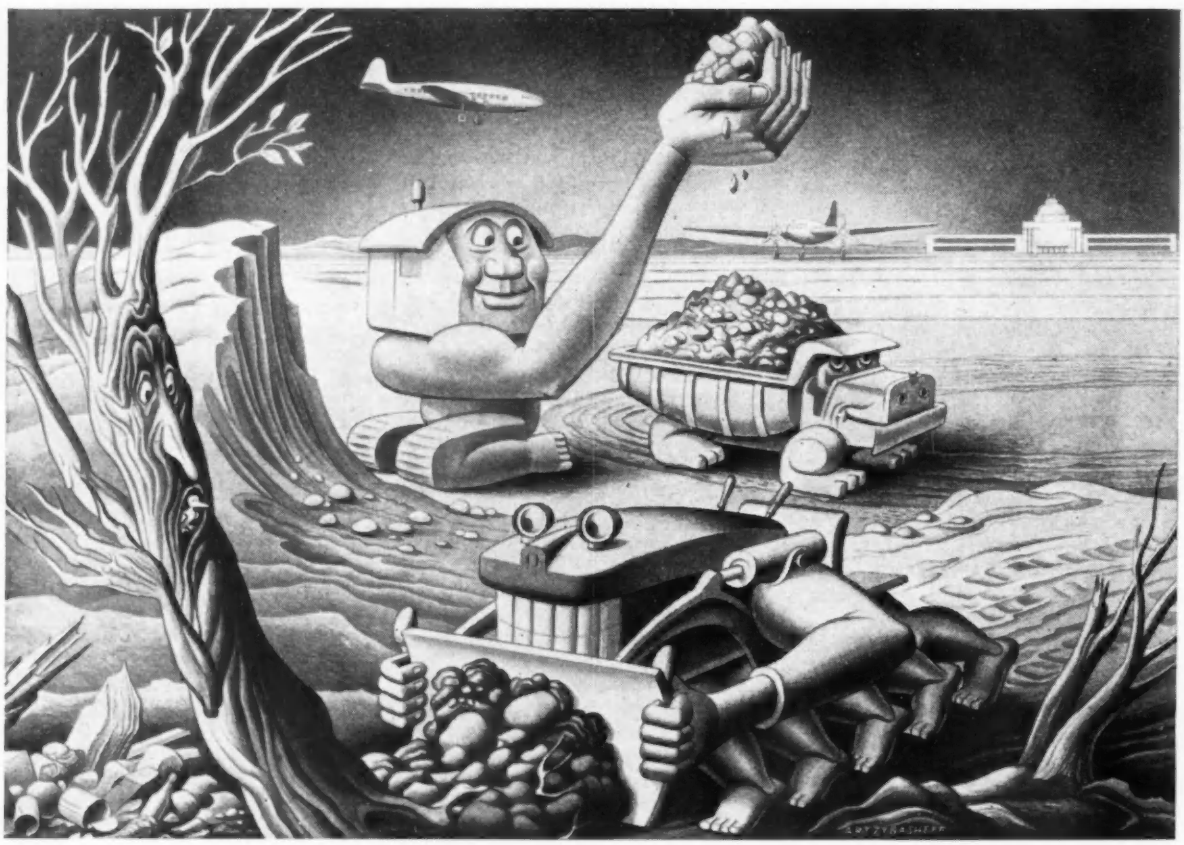
Production fell below the scheduled 1944 program for all classes of tractors, WPB said. The lag for all classes, as presented at the meeting, follows. Class I—176 less than schedled for the year; Class II—270 less; Class III—1,006 less; Class IV—598 less; Class V—166 less; Class H-G (agricultural type)—840 less. Failure to meet the 1944 schedule was due to component shortages and lack of manpower in suppliers' plants.

For 1945, the scheduled program calls for 38,693 tractors, with distribution among classes paralleling the 1944 schedule, WPB officials said. The industry's facilities will undoubtedly be needed in 1946 to the same extent as under the 1945 program, since civilian demand will make up for any decrease that may occur in military requirements, they declared.

Production of spare parts in 1945 is expected to equal that of 1944, but items produced will depend upon military requirements, committee members said. They urged that military orders for parts be placed as far in advance as possible. In 1943, dollar value of parts produced was $97,542,000; in 1944 it was $118,769,000, WPB said. Distribution of parts in the two years shows an increase for the military in 1944,

• **Shovel, bulldozer and truck assume distinctive personalities as artist Artzybasheff portrays the significance of dirt-moving equipment to progress in this drawing used by Wickwire Spencer Steel Company in a recent advertisement.**

Reprinted with Permission from Wickwire Spencer Steel Company



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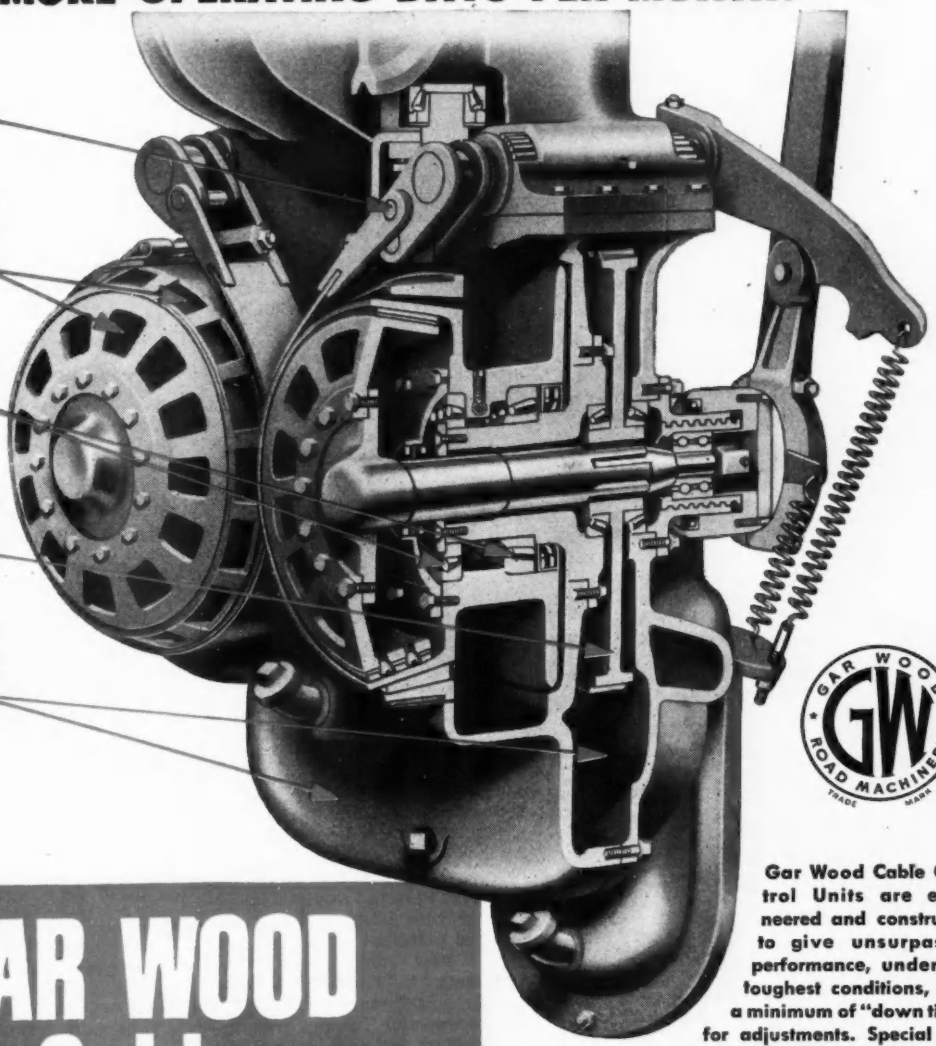
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• Part of the intensive training received by the Seabees at Camp Rousseau, in the Port of Huenome area, is a thorough drilling in the operation of tractor equipment. Here an instructor demonstrates the correct manner of making a cut with a Bucyrus-Erie Bullgrader.

with a corresponding decrease for domestic use, including Canadian. Percentage distribution of parts in 1943 was military, 35.2 per cent; domestic, including Canada, 57.2 per cent; export, 7.6 per cent. In 1944—military, 49.5 per cent; domestic, including Canada—43.3 per cent; export, 7.2 per cent.

Due to shortages of steel and other critical materials, allocation of materials for tractor production in the second quarter of 1945 is about five per cent less than that for the first quarter of 1945, and 12 per cent less than that for the fourth quarter of 1944, WPB officials said.

Surplus Property Group To Unify Procedure

The Office of Surplus Property of the Treasury's Procurement Division announced its adoption of new procedures to be effective in the near future, to bring about uniformity in its Regional Offices throughout the country in the forms and methods used for competitive bidding. At the same time announcement was made of a new provision in Treasury's sales contracts permitting the Government to cancel any sale made to any bidder who acted on behalf of an undisclosed principal.

Under the new bidding procedure, which supplants "informal" bidding by letter, telephone, telegraph, or personal interview, prospective bidders who indicate an interest in surplus property which has been advertised for sale, will be furnished bid forms containing detailed descriptions of the property and advised of the day and hour when bids for such property are to be opened. Bidders will be entitled to be represented at the opening of their bids. Former practices of opening bids as received and of offering property without a definite closing time for the submission of bids are to be discontinued. The methods employed will closely approximate those used in competitive bidding for regular Government purchases but will be adapted to the special problems of surplus property disposal in such a way as to make for the greatest simplicity for prospective buyers.

The new condition relating to undisclosed principals has been adopted, it was said at Treasury's Office of Surplus Property, as a means of discouraging speculative transactions by persons falsely representing themselves to be agents for unnamed business houses.

Flood Control Program Set For the Mississippi

Expenditures of $14,335,000 for levee enlargements; $8,326,000 for bank revetmens, and $5,600,000 for dredging in the Memphis, Vicksburg and New Orleans Districts have been planned for the next construction season by the Mississippi River Commission. This was revealed when the House of Representatives passed the War Department civil functions appropriation bill giving $30,000,000 to the alluvial valley for the fiscal year beginning July 1, 1945.

Organize Kaiser Engineers

Engineers long associated with Henry J. Kaiser, and responsible for the design and construction of some of the world's outstanding projects, have been organized as a permanent group known as Kaiser Engineers, with headquarters in the Kaiser Building, Oakland, California, it was announced this week by Henry J. Kaiser.

This move will make available to others the engineering talent which has been responsible for the design of many of the Kaiser projects. Of the more than 200 members of the staff in Kaiser Engineers many were employed on such projects as Boulder, Grand Coulee and Bonneville Dams; Delaware Aqueduct; the Kaiser steel plant near Fontana, California; the world's largest cement plant owned by Permanente Cement Company; the carbothermic magnesium plant of The Permanente Metals Corpo-

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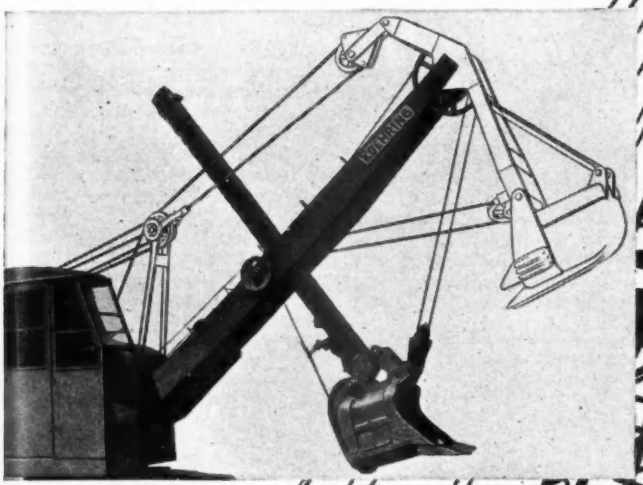

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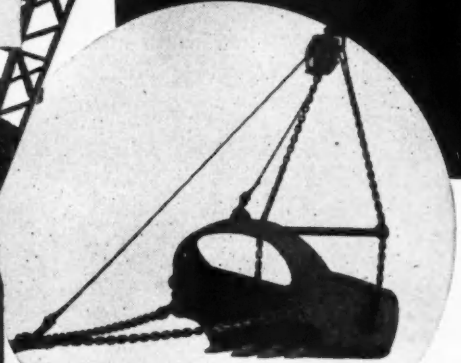

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HEAVY-DUTY CONSTRUCTION EQUIPMENT

• Bulldozers scraped sand and earth from the beach to hurriedly build the "roads" for these ships' invasion traffic so that this armada of LST's could pour army equipment ashore at Tacoblan airstrip on Leyte Island. Bomb craters, blasted in the invasion softening process, are clearly visible.
Official U. S. Navy Photo

ration; and the record-breaking shipyards at Richmond, California; Portland, Oregon and Vancouver, Washington. Members of this organization conceived, designed and built the nine and one-half mile conveyor belt which hauled gravel for Shasta Dam. They also solved many difficult problems in connection with the construction of Bonneville Dam.

Henry J. Kaiser is President of the new organization, with E. E. Trefethen, Jr., Vice President; T. M. Price, Vice President; and George Havas, Vice President and General Manager. It is the announced policy of the company to undertake engineering work in any part of the world.

Municipalities Urged to Plan New Facilities Now

Improved community facilities, particularly water and sewerage systems, should be planned now for immediate construction in the postwar period, not only because health and welfare rank first, but also because such public works would provide local employment for war workers and war veterans and stimulate business activity in many fields, H. E. Foreman, managing director of the Associated General Contractors of America, declared in releasing statistics on the labor and materials used in such construction.

On water and sewerage projects totaling $1,000,000 at 1940 prices, wages for labor at the construction site would total $318,000, or 31.8 per cent of the total cost, according to statistics compiled by the U. S. Bureau of Labor Statistics. Materials used would total $492,000, or 49.2 per cent, and other expenses including profit, $190,000, or 19 per cent.

A total of 330,000 man-hours of labor would be provided on the site, and 430,000 hours off site—in mines, forests, factories, transportation and administration—and about 50 different kinds of materials and equipment would be used in the projects. Of the total value of materials for the projects totaling $492,000, iron and steel and their products would cost $236,200; stone, clay and glass products, $122,500; machinery, $57,100; forest products, $42,800; non-ferrous metals, $9,900; chemicals, $6,400; other materials, such as electrical fixtures and roofing, $17,100.

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Request States Designate Interstate Road Routes

Each state highway department has been requested to proceed at once with a designation of routes for inclusion in the National System of Interstate Highways, it was announced by Thomas H. MacDonald, Commissioner of Public Roads. The designation is to be made in accordance with the Federal-Aid Highway Act of 1944.

The Highway act requires that: "The routes of the National System of Interstate Highways shall be selected by joint action of the State highway departments of each State and the adjoining States, as provided by the Federal Highway Act of November 9, 1921 for the selection of the Federal-aid system."

Under this provision, the Administrator of the Federal Works Agency is authorized to approve routes proposed by the State highway departments for inclusion in the National System of Interstate Highways.

In making the announcement Commissioner MacDonald said, "Designation of the system is an important step toward launching a large post-war highway program. Construction of such a system is an outstanding feature of the long-range highway program. The recent Federal legislation authorizes $225,000,000 for the Federal-aid Highway System and $125,000,000 for urban

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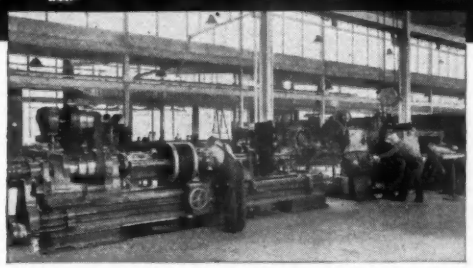
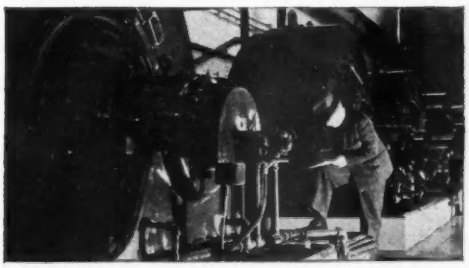
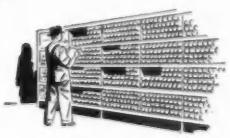


34 MODERN REPAIR PLANTS—These plants are fully equipped to handle repairs on any electrical equipment, which is not too large to be moved. Equipment includes special apparatus for High Frequency Testing, Dynamic Balancing, Metal Spraying, Phos-Copper Brazing, etc.



12 ENGINEERING AND SERVICE OFFICES—Factory-trained engineers are available to diagnose trouble, and work with your own engineers to speed up repairs. Portable field equipment assures accurate results.



17 RENEWAL PARTS WAREHOUSES — Conveniently located warehouses can give you prompt service on genuine Westinghouse renewal parts. A Maintenance Engineer is available to discuss any of these problems with you.

A Local Service for the Mining Industry

Whenever you need major electrical repairs in your plant—or repair and overhaul of equipment outside your plant—call Westinghouse. A nationwide maintenance organization, with local branches as close as your telephone, is ready to help you get apparatus back on the job in the shortest possible time.

This service offers 3-way flexibility to meet your needs: (1) *A Local Repair Plant*—completely equipped to handle repair and reconditioning of motors, generators, controls, transformers, etc. (2) *Field Engineering and Service* to handle major repair or overhaul jobs right in your plant. (3) *Renewal Parts Warehouses* to give you prompt service on genuine Westinghouse replacement parts.

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WHAT "FACTORY-PROVED" MAINTENANCE MEANS

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• Bucyrus-Erie 54-B 2-cu. yd. stripper at work stripping coal for Weirton Construction Co., Weirton, W. Va.

highways in each of the first three postwar fiscal years. These funds will be available for improvement of the National Interstate System and other highways."

In requesting early action on the tentative designation of a system, Commissioner MacDonald directed the attention of the State highway departments to the report entitled "Interregional Highways" published as House Document 379, 78th Congress, 2nd Session and particularly to the Interregional Highway System recommended therein by the National Interregional Highway Committee with the concurrence of the Public Roads Administration. He also directed attention to the recommendation concerning the advisability of a further designation of circumferential and distributing routes within and around the larger cities connected by the system. It was made clear that in presenting these recommendations for consideration the Public Roads Administration intends in no way to limit the freedom of action of the States in selecting routes for tentative designation.

In reaching a decision on the routes to be tentatively designated each State highway department is required by the law to act jointly with the highway departments of adjoining States.

The State highway departments are asked to submit to the Public Roads Administration by July 1, maps showing the routes tentatively designated accompanied by data indicative of the merits of these routes.

On the basis of these proposals a system conforming to the 40,000-mile limitation will be designated by subsequent agreement of the States and the Public Roads Administration and submitted for approval by the Federal Works Administrator.

1945 Bituminous Coal Situation Is Bad

Bituminous coal production during 1945 will be 50,000,000 tons short of meeting requirements if the war in Europe continues, Secretary of the Interior Harold L. Ickes has advised the

(Continued on page 208)

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MANY WAYS

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Our complete line of top-quality lubricants—PLUS regular on-the-job delivery service—saves interruptions . . . reduces inventory problems, cuts costs.

Your Socony-Vacuum Representative is always ready to work *with* your crews in making a careful analysis of time-losing problems. He'll supply you with field-tested maintenance schedules and cost-cutting ideas adapted to *your* individual needs—provide qualified engineering help and other practical aids.

Instead of merely getting fuels and lubricants, *you get complete on-the-job service when you buy Socony-Vacuum products.*

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CORRECT LUBRICATION FOR EVERY PART OF EVERY MACHINE YOU OPERATE . . .
PLUS
1 ENGINEERING HELP on time-losing operating problems; 2 TESTED MAINTENANCE SCHEDULES that minimize service man-hours—keep equipment on the job; 3 PROMPT, DEPENDABLE DELIVERY—a reliable, on-the-job service that eliminates inventory problems for you!

Shots from the Firing Line

(Continued from page 204)

War Production Board.

Because of an anticipated loss of 30,000 miners in the soft coal industry this year, the "industry will be fortunate to produce 570,000,000 tons," he said.

Anthracite output, faced by an anticipated loss of 4,000 miners, is likely to drop 4,500,000 tons under the 64,500,000 tons produced in 1944, he said. This decrease will necessitate additional limitations on consumers.

Although victory in Europe would make the coal situation less critical, it will remain tight while the war in the East goes on, he said.

"Coal production is on the downgrade, requirements remain at peak levels, and consumer stocks are dangerously low. The main trouble is lack of adequate manpower," he said.

• Road graders work in muck to build road in a Pacific jungle.
Signal Corps Photo

Make Recommendations on Surplus Property Disposal

Constructive recommendations on the methods of disposing of surplus construction equipment were made to the Surplus Property Board by the American Road Builders' Association.

Charles M. Upham, delegation spokesman, said, "It is our hope that the policies we have outlined will be given consideration by the board to the end of stabilizing conditions within the construction industry during the transition period and providing maximum employment." He pointed out that disposal of surplus property in an orderly fashion through normal trade channels would go far toward maintaining full employment and conserving a prosperous national economy.

The recommendations covered the manner of disposing of new and used equipment and spare parts; advocated that the government receive a fair price for all surplus property sold no matter who was the purchaser; asked regulations on the amount of equipment that might be bought by federal, state and local government agencies; recommended that equipment now outside the United States be disposed of abroad; opposed rental of equipment by governmental agencies; and made a plea for protection of small business by inviting bids on small lots segregated by types, trade names and models. The delegation also asked that a Construction Equipment Advisory Committee be selected from the construction industry to advise the board on conditions within the industry.

The proposals of the American Road Builders' Association were the result of a series of conferences in Washington in which the aims and beliefs of representative manufacturers, distributors and contractors were aired. After the presentation of the recommendations the committee was asked to make further studies of the construction industry for the information and guidance of the board.

Termination Regulation Is Available to All Contractors

Although the Joint Army-Navy Termination Regulation is the "Bible" for war contractors to be used in the rapid settlement of war contracts, a recent survey discloses that less than 40% of the war contractors circularized had availed themselves of this publication. A Joint Army-Navy Distribution Center has been established in New York to distribute this publication together with other printed material pertaining to contract settlement.

There is no charge for any publication distributed by the Distribution Center. Contractors merely have to write to the Joint Army-Navy Distribution Center, 90 Church Street, New York, New York, Attention: Lt. E. P. Lull, and copies will be forthcoming.

Idaho Increased Gas Tax To Provide Matching Funds

Just before adjourning its 1945 session, Idaho's legislature gave final approval March 8 to a bill increasing the state gasoline tax from five to six cents per gallon, one of three tax measures backed by Governor Gossett to provide matching funds for postwar highway construction.

A House-approved bill to increase licenses on commercial trucks was killed in the Senate state affairs committee, however, while the House recommitted a bill to impose a ton-mile tax on trucks and buses.

Governor Gossett had told legislative leaders that the state highway fund was in the red and showed them a statement from State Auditor Ernest Han-

Save Labor! Cut Costs!

with SAUERMAN CRESCENT SCRAPERS

Explanation of Picture —
Above is a Sauerman Crescent Scraper cutting deep into hill and hauling gravel to crusher. Bucket is pulled to rear of cut, gathers a heaping load, and carries load to hopper in a little over a minute; then dumps instantaneously into hopper. Simple and sure and cheap.

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At gravel and stone crushing plants, in strip mines and wherever there are problems of stockpiling or excavating, Sauerman Crescent scraper buckets daily demonstrate their ability to dig and deliver large tonnages of materials at costs of a few cents a ton.

The secret of "Crescent" efficiency is in the streamline design of this unique bottomless bucket. A Crescent scraper penetrates hard materials with the ease of a plowshare, and requires less linepull than any other type of scraper to move a given load.

Ranging rapidly over a large area, loading and dumping automatically, a Crescent Scraper, operated by a Sauerman improved hoist, is the most productive one-man machine for digging and hauling.

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CUTS PRODUCTION COSTS 3 WAYS

One reason is enough—but here are *three* reasons why Preformed wire rope cuts production costs:

1. Preformed lasts longer; pays bigger dividends on wire rope dollars.
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Thousands of operators have standardized on Preformed—and use nothing else on tough wire rope jobs.

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Specify AGILE
ELECTRODES

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For hard-facing where high hardness and resistance to abrasion are required.
Hardness 400-550 Brinell

PINK...
For hard-facing of surfaces exposed to great wear; where machining after welding is necessary.
Hardness 200-250 Brinell

VIOLET... The weld deposit is work-hardening. Especially recommended for hard-facing where high impact and abrasion are present. As welded; 200-220 Brinell. Hardness increases rapidly to 450-500 upon cold working.

RED... For hard-facing ordinary steel parts that are frequently renewed, or where a good hard, machined surface is required. The weld is well in the machineability range of 200-250 Brinell.

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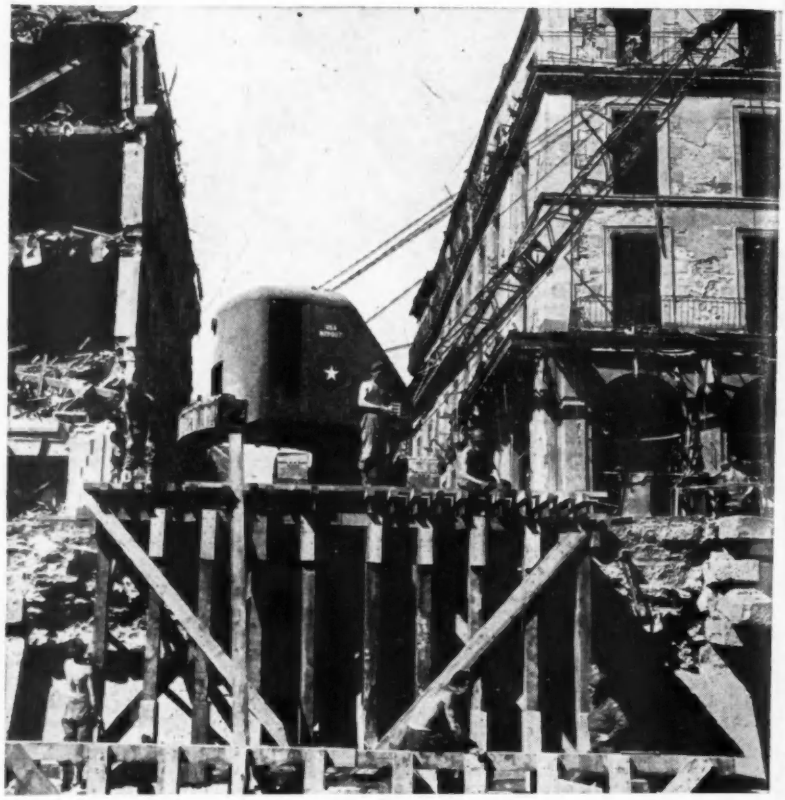

• U. S. Army Engineers use this Osgood crane to rebuild a bridge destroyed by fleeing Nazis in Rennes, France, in their vain attempt to halt the American drive.
Signal Corps Photo

sen that the department would be issuing registered warrants by April or May. He reiterated that extra funds were needed not only for matching purposes with federal postwar highway funds, but for actual maintenance and construction operations.

The Governor had pointed out that Idaho needs some $3,000,000 annually during the first three postwar years to match about $5,000,000 to be given by the federal government for highway work in the state. As contrasted with these needs, it was estimated that the gasoline tax increase will raise $800,000 a year.

Louisiana Estimates 1945 Highway Expenses

Estimates that 1945 construction, maintenance and operation of Louisiana's highway system would cost $17,961,094, of which federal contributions would total $6,633,198, were announced by Director D. Y. Smith and Chief Engineer Harry B. Henderlite of the State Highway Department.

Listed among estimated disbursements were $4,972,464 in incompleted construction from 1944 and $157,443 in state aid to parish work, $2,848,223 in new projects, $390,348 in state parish aid, $400,000 in postwar planning, $7,369,490 in maintenance, $250,000 for right-of-way, $160,000 for equipment, $1,001,069 for administration and engineering, $173,055 in statutory changes and $239,000 for miscellaneous.

Not included in the work estimate were funds for retirement and interest on highway bonds, set by law.

Smith reported that 1944 expenditures totaled $11,240,076 of which $3,534,290 went for new improvements and change of existing facilities to a higher class, $4,873,795 was for maintenance, postwar surveys and engineering cost $140,334, replacements amounted to $1,913,193 (including $1,633,808 in restoration of designated routes and bridges in maneuver areas), and $778,464 for resurfacing and reconditioning an estimated 2,255 miles of school bus, mail and farm-to-market roads.

Army Studies Airfield Development Problems

Realizing that the increasing weight of military airplanes, and the consequent increasing cost and difficulty of airfield construction, will necessitate the continuation of pavement and other design studies on a large scale, the Chief of Engineers, U. S. Army, has established a Board of Consultants to advise his office on airfield development and design problems, and has delegated specific functions in airfield development studies to various laboratories in the Engineer Department.

The Board of Consultants, composed

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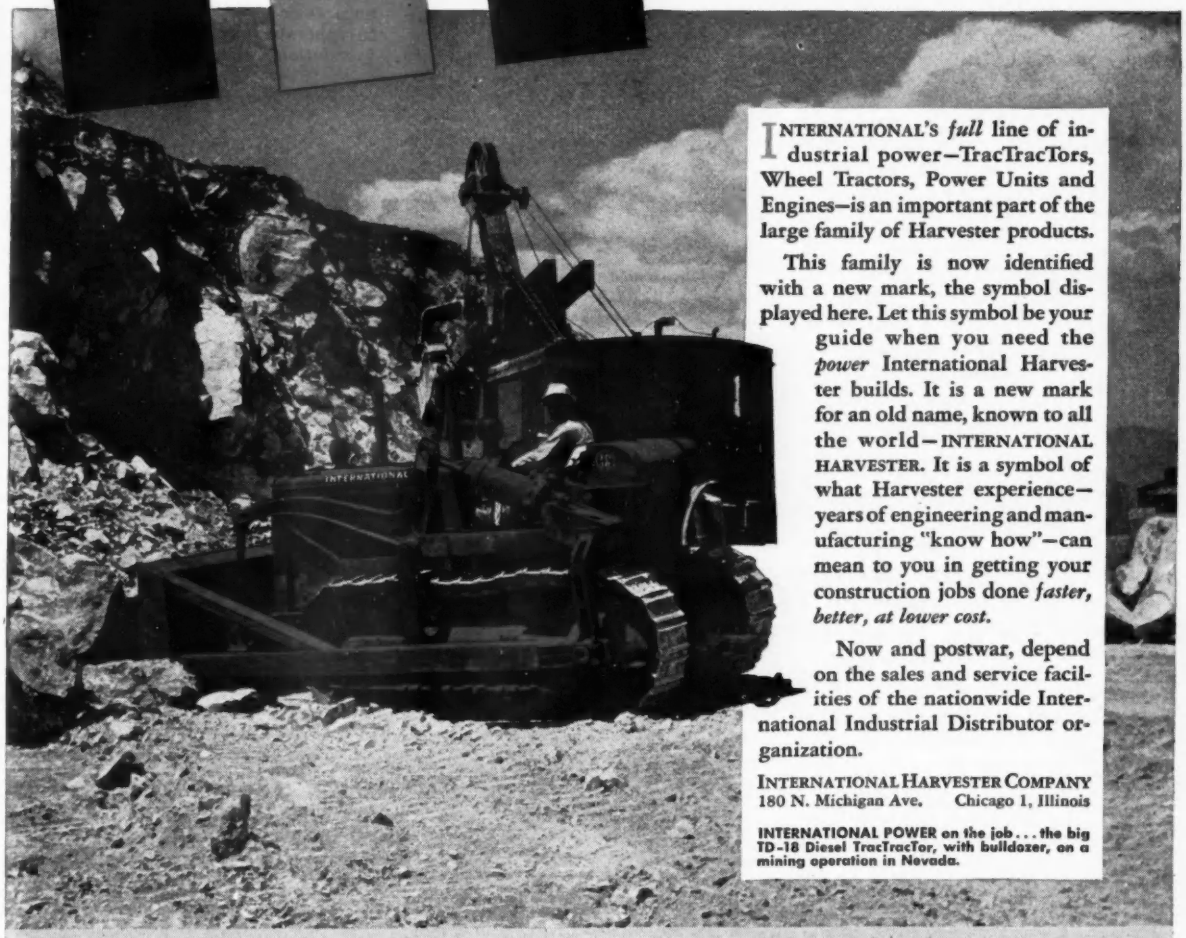

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Now and postwar, depend on the sales and service facilities of the nationwide International Industrial Distributor organization.

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INTERNATIONAL POWER on the job . . . the big TD-18 Diesel TracTracTor, with bulldozer, on a mining operation in Nevada.

Power for Victory . . . Power for Peace

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• **Bucyrus - Erie Bullgrader and Dozershovel work together in bringing dirt for a fill to a new tent site in the extensive Camp Pendleton area, California.**

of nationally prominent engineers in the fields of pavement and soil mechanics, with the Chief of the Engineering and Development Division, Office Chief of Engineers, as chairman, has the following members: Dr. H. M. Westergaard, Dean of the Graduate School of Engineering, Harvard University; Dr. Arthur Casagrande, Associate Professor, Graduate School of Engineering, Harvard University; J. L. Land, Chief Engineer of the Bureau of Materials and Tests, Alabama Highway Department; Fred C. Lang, Engineer of Materials and Research, Minnesota Highway Department (Member, Executive Committee, Highway Research Board); O. J. Porter, Senior Engineer of Materials and Tests, California Highway Department, and T. A. Middlebrooks, Civil Works Division, Office Chief of Engineers.

The specific functions delegated to Engineer Department laboratories in airfield development studies are as follows:

The **Flexible Pavement Laboratory,** which is a part of the Embankment, Foundation and Pavement Division of the U. S. Waterways Experiment Station at Vicksburg, Mississippi, will coordinate tests and investigations relating to bituminous pavements and underlying foundations.

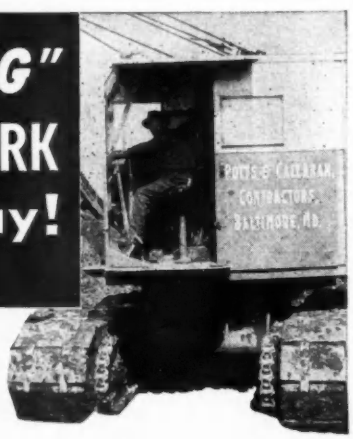
The **Rigid Pavement Laboratory,** which is part of the Cincinnati Testing Laboratory of the Engineer Department's Ohio River Division, will coordinate tests and investigations relating to concrete pavements and underlying foundations.

The **Frost Effects Laboratory,** which is a part of the Soils Laboratory of the U. S. Engineer District Office, Boston, Massachusetts, will coordinate tests and investigations relating to behavior of subgrades and base courses subjected to frost action.

The U. S. Engineer Department, which is the civil works agency of the Corps of Engineers, was given the responsibility for Military Airfield Construction during the latter part of November 1940. The problem which faced the Department at that time was, broadly, to provide consistent and adequate criteria for the layout of airfields and for the design of drainage and pavements. Since there were no other data available, the Department had to adopt the principles of highway practice for the design of pavements and drainage. However, these principles were not entirely adequate for airfield design. While in the beginning a wheel load of 15,000 pounds was the basis of design in contrast to a highway load rarely exceeding 9,000 pounds, the wheel loads of military airplanes have increased progressively to 60,000 pounds, with still heavier loads expected in the immediate future. The distribution of traffic on runways, too, does not follow the highway pattern. Also, the broad expanse of paved areas with intermediate unpaved areas presents a considerably different drainage problem.

The progress which has been made since 1940 is the result of large-scale and broadly conceived experimentation, intensive investigation of the experience of the Department and other agencies, and close liaison with the Army Air Forces. The investigations have included experimental tests to determine the effect of repetitions of loads on various types and thicknesses of pavements,

Less "SEAT FAG" means MORE WORK Per Man Per Day!



By reducing operator "Seat Fag" in your shovel work, you can very definitely get *more work per day* out of your very limited available manpower. Milsco CUSHION SEATS are the answer.

The comfortable, form-fitting contour of the Milsco seat is heavily upholstered and covered with either genuine black leather or duck. Milsco seats are designed to fit both the operator and the equipment. Hinge attachment makes it ideal for use on cranes or shovels where cab space is restricted.

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No. 813
Bucket Type Cushion Seat with back rest.

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Semi-Bucket Type Pony Seat.

Milsco MILWAUKEE Cushion Seats FOR FARM AND INDUSTRIAL EQUIPMENT

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GRADER AND SCARIFIER BLADES

For any type or make of machine—Motor Graders, Maintainers, Scrapers, Drags, Bulldozers, Backfillers, Wagon Scrapers, Trail Builders, Trail Blazers, Carryalls, Snow Plows. Also—

CUTTING EDGES, WEARING BOOTS, BACK SLOPERS, EXTENSION BLADES, MOLDBOARDS and SCARIFIER TEETH

50 years of specializing in the manufacture of Construction Equipment Blades has developed for your benefit a quality of special steel, milled through our own rolls and forged at the edges to give that extra cutting and wearing quality you need.

Furnished in various widths, lengths, and thicknesses, punched ready to fit your machine.

Consult your internationally recognized Blade Specialists. Write for special bulletins, giving type and name of machines you operate—get set for Blades early.

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A Time-Saving ACCESSORY

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Beco Blocks and Linings take the heavy loads at the increased speeds demanded of modern excavating equipment. These Beco products are durable and tough — that's why replacements and adjustments are less frequent.

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A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

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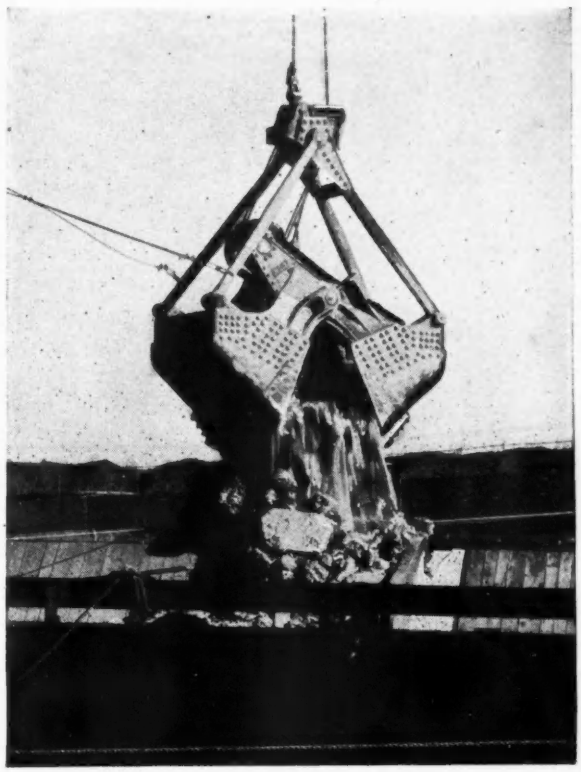

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Every Blaw-Knox bucket is designed for a specific purpose—the greatest output from your crane.

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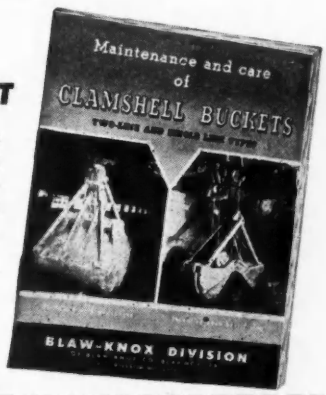
Bulletin 2004 gives complete instruction on the Care and Maintenance of Clamshell Buckets . . . copy on request.



• A maze of equipment and supplies clutters the beach as American troops unload supplies from LST's in Leyte Gulf in the Philippines. The bulldozers and two Bucyrus-Erie 15-B cranes that can be seen along the water line play a vital role in this operation.

Signal Corps Photo

which have led to the tentative adoption of design curves and the correlation of test data to substantiate their validity.

The service behavior of airfield drainage systems is being currently observed by several of the Department's field offices; and the reports are being studied by the Office Chief of Engineers with the view of improving design criteria on the basis of experience.

The problem of airfield layout, as to length, width, and grades of runways; location of taxiways; dimensions of safety zones; and related factors, is under intensive review and restudy jointly by the Office Chief of Engineers and the Army Air Forces.

The resources which have been brought to bear by the Office Chief of Engineers on airfield design problems have been adequate to keep abreast of aeronautical development to date; and the wealth of information gained, together with the organization established to continue the investigations and developments, should have an important bearing on the airfield design of tomorrow—since military airplanes to a large extent are influencing the type of commercial plane of the future.

National Security In Design

Security from air attack may cause highway engineers of the future to avoid long, straight roads reaching mile after mile which serve as directional arrows to flyers, the Office of Civilian Defense believes. Classifying roads and paths as "among the worst of visual give-aways," OCD thinks highways should be located so as to follow natural elements of the terrain and that low-visibility requirements may be satisfied by short stretches of tangent interspersed with curves.

CVP Water Supply

More than 1,283,000 acre-feet of water is impounded back of Shasta Dam, officials of the Bureau of Reclamation announced in Sacramento. This is the greatest amount of water contained in Shasta Lake since storage began on January 1, 1944. (An acre-foot of water is enough to cover one acre of

on ROGERS TRAILERS

GETTING there "fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers!

In the lightning speed of mechanized warfare tanks ride "Pick-A-Back" to battle on ROGERS TRAILERS so their fighting capacity is unimpaired. Special ROGERS TRAILERS retreive disabled tanks so they can be repaired and rushed into battle again.

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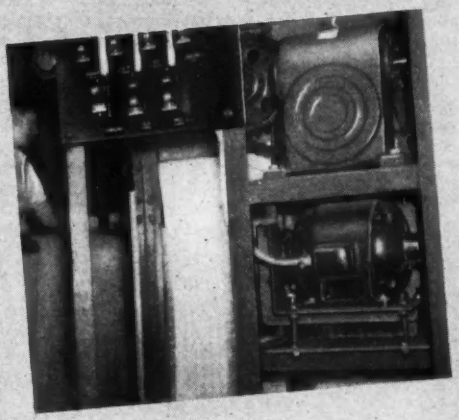
IN STUFFY SPOTS

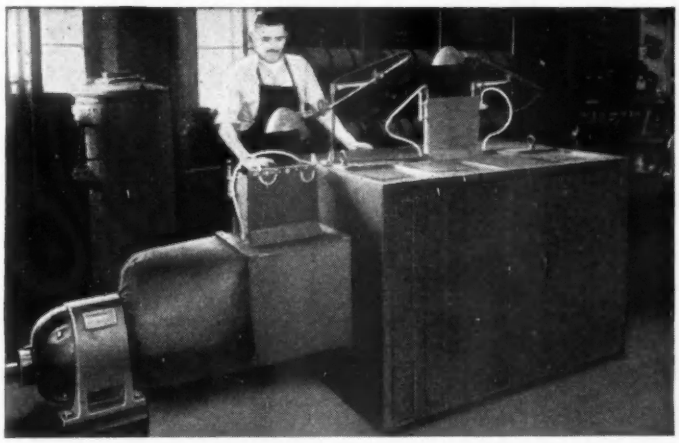
Many a motor must be located where walls, adjacent equipment, or materials cat down the free flow of air. Sometimes, as in the case of this wool-dryer drive, surroundings are hot, and stuffy, too.

Tri-Clad motors have proved themselves cool-running even under such conditions. Their powerful, double-end ventilating system moves the air at controlled velocity for effective heat removal. The location and baffling of dual exhaust ports discourage recirculation.



Tri-Clad motor drives conveyor on wool dryer—Bigelow Sanford Carpet Co., Amsterdam, N. Y.

AIR-FLOW TESTS OF TRI/CLAD MOTORS LEAD TO PROTECTION FROM OVERHEATING



Plenum chamber test of Tri-Clad motor ventilation at G-E motor factory.

Before new types or sizes of Tri-Clad motors are approved for production, plenum chamber tests are conducted on the ventilating systems of sample models. These measurements serve as a check on previous calculations of the volume and velocity of air through the motor under different conditions. Other tests under load within enclosures and at abnormal ambient temperatures are also made. If your motors must be confined in stuffy spots, G.E. can help you make the right choice to beat the heat. *General Electric Company, Schenectady 5, N. Y.*

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ground one foot deep; one acre-foot contains 325,850 gallons.)

Since September 26, when the water surface reached its lowest elevation during the current irrigation season, an average of 4,800 acre-feet per day have been added to the lake. In terms of a city water supply, sufficient water is stored in Shasta Lake each day to supply an average city of 100,000 population for five months. At the present time the lake is 325 feet deep at the upstream face of Shasta Dam.

Storage at Shasta Lake during the late winter and spring months of 1944, made it possible to generate 255 million kilowatt-hours of electric power and energy and to supply from storage Sacramento Valley irrigators during the past summer with 258,000 acre-feet of water which otherwise would have been lost into the ocean. Late summer and fall releases retarded the encroachment of sea water and therefore held salinity in the upper Delta channels to a safe minimum.

Daily gains in storage at Shasta within recent weeks have ranged from a low of 2,000 acre-feet on November 28 to a high of 32,000 acre-feet on December 2. The maximum short period gain occurred between December 1 and December 7 when 100,000 acre-feet were stored.

Millerton Lake on the San Joaquin River 20 miles north of Fresno, also in operation during the 1944 season, contains 173,000 acre-feet, a gain of 68,000 acre-feet since October 25, the date the U. S. Bureau of Reclamation began recovering storage after the heavy releases for irrigation during the summer and early fall months.

The combined storage of Central Valley Project reservoirs on December 13 amounts to 1,470,000 acre-feet or 490,000 million gallons, which is sufficient water to furnish a city the size of San Francisco with its entire supply for approximately 17 years.

Government, Private Enterprise Cooperate on Highway

Here is the story of cooperation between private industry, land owners, county supervisors and the state and Federal governments in building a new mountain highway that resulted in increasing lumber output for the war effort by more than 8,000,000 board feet a year. The project consisted of widening, straightening and surfacing 29 miles of county and state highway from the railhead at Martell, California, elevation 1,500 feet, to Cook's Station, 5,000 feet, the junction of private logging roads and the state highway.

Funds for the $356,000 improvement came $300,000 from the Federal Government, $40,000 from the California Division of Highways and $16,000 from three lumber companies. Nine miles of county highway had been widened and surfaced earlier with combined county and logging company funds, but further improvement was necessary to bring it up to required standards. Property owners donated land for rights-of-way.

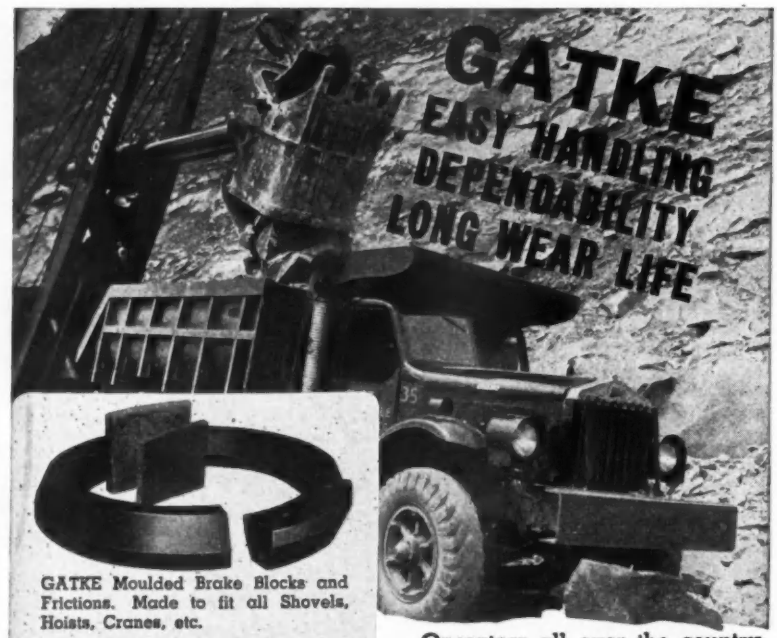
The improvement makes possible year-round production in lumber mills which previously operated less than 180 days per year and had to suspend during the winter season because of road conditions.

South Dakota Needs More Money to Match Funds

That added revenues may be sought to enable South Dakota to match federal postwar highway aid was reported in Pierre, despite the fact that Gov. M. Q. Sharpe and members of the State Legislature had earlier expressed the opinion that no new taxes would have to be levied.

Recently enacted federal highway legislation would make $6,273,000 in federal aid available to South Dakota in each of the first three postwar years. This would be divided into $3,535,000 for the federal aid system, $2,516,000 for secondary and feeder roads, and $222,000 for urban roads.

State Highway Commissioner E. W. Meeker has stated that state highway funds now held in reserve are sufficient to match the $3,535,000 available the first year, but that for the two succeeding years the state would fall short about $3,308,000 in matching the rest of the allocation. The State Highway



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Operators all over the country agree that *when you have GATKE Brake Lining and GATKE Clutch Facings, you have the best.*

GATKE Asbestos Friction Products have been perfected for every *brake and clutch* — LARGE or small.

Experience and knowledge acquired in 28 years of development to meet operators' service requirements go into their making.

Whatever your equipment or service, just tell us what you want. We *understand* service requirements and *we have what it takes* to meet them!

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232 N. La Salle St. Chicago, Ill.

Commission had not at this writing made any recommendations as how the additional funds could be raised.

It has been pointed out that matching needs will be even greater for the secondary and feeder roads, which comprise mostly county roads. South Dakota counties had accumulated about $2,500,000 as of Dec. 31, 1943, but these funds have been dwindling because of a county budget law provision which says that no county levies may be made as long as the county has unspent road funds. They are now being spent for maintenance work.

South Dakota counties derive their funds from shares in the license and gasoline revenues, as well as from direct property levies. Both license and gasoline revenues have been declining under war conditions. With the automotive industry unable to immediately fill the demand for cars after the war, a sharp early uptrend in these revenues is not expected.

A gasoline tax increase has been suggested as one way to raise additional revenue for the postwar road program. Another proposal is that the county budget law be amended to permit counties to accumulate highway funds, raised by direct taxation.

In the 25 years in which South Dakota has been constructing a road system, it has spent $110,000,000, but still has only 400 miles of concrete and 2,500 miles of blacktop.

State Highway Officials Estimate Improvement Costs

The minimum amount of needed reconstruction on main or principal highways as of July 1943 total $7,027,428,746, according to reports of the American Association of State Highway Officials.

These estimates include 74,885 miles of main highways that should be rebuilt at an estimated cost of $2,606,959,894 and 46,654 miles which should be widened at a cost of approximately $1,192,451,010. Needed relocation, requiring reconstruction, totals 36,927 miles of highways and would cost an estimated $2,418,982,994.

Main roads needing rebuilding, widening or relocation total 158,466 miles with an estimated overall cost of $6,218,393,898.

The State Highway Officials report that 30,038 bridges on main roads need to be widened or rebuilt at an estimated cost of $809,034,848.

May Name Highway in Honor of Heroes

Plans are under consideration for naming sections of the Inter-American Highway, linking North America with South American capitals, in honor of heroes whose lives and deeds are associated with the areas it traverses.

• View of road built by Seabees with Caterpillar tractors and Angledozers through the mountainous terrain and heavy jungle of Hollandia on Humbolt Bay, Dutch New Guinea.

Huge Engineering Projects Planned Throughout World

Orders are on the books and others are ready for filing for a vast amount of American excavating and other engineering equipment, and many American engineers will have long time employment in the development of dozens of huge projects around the world.

Uruguay has an ambitious power development project for the Reio Negro river which calls for a 3,800-foot dam impounding the largest artificial lake in South America. Orders for the necessary machinery have been placed with six American firms.

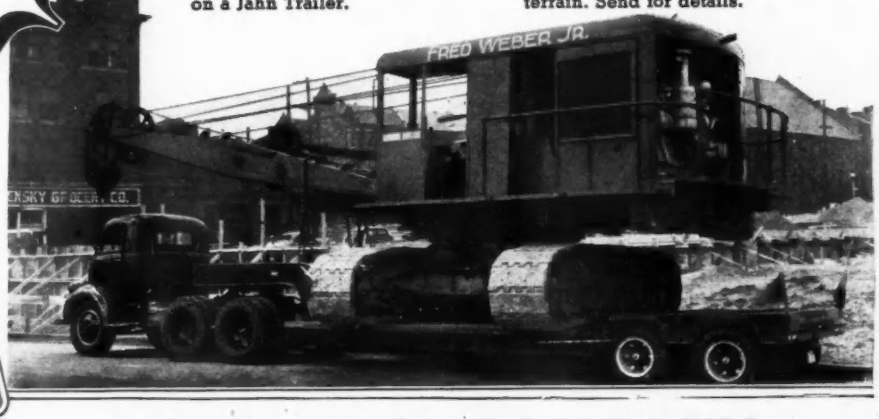
Chili has a seven-project plan for an 18-year development of hydro-electrification and hopes to spend $18,000,000

JAHN HEAVY DUTY TRAILERS

. . . save time and money between jobs!

JAHN Heavy Duty Trailers are the answer to quick movement of heavy equipment from job to job assuring more profitable operation by reducing idle time. There's a full range of sizes with any wheel or axle combination. All models are easily and quickly convertible from full to semi-trailers. Whether your load weighs 5 or 100 tons you can move it safely and quickly on a Jahn Trailer.

The new hydraulic brake application developed by Jahn engineers increases the safety on all loads because of smoother, faster braking action with positive, equal brake pressure on all wheels. Unlimited axle oscillation is permitted without affecting braking action There's no possibility of partial application or dragging of brakes when operating over rough terrain. Send for details.



JAHN Heavy Duty TRAILERS Capacities from 5 to 100 TONS

"Come to Trailer Headquarters"

C. R. JAHN COMPANY

1349 WEST 37th PLACE • CHICAGO, ILLINOIS

• This huge rooter, weighing 30,000 lbs., especially designed and built by Post Bros., opens a trench seven feet deep to lay a new telephone cable between Los Angeles and San Diego, Calif. This dual purpose machine (rooter plow and deep cable layer) is ten feet high, 12 feet wide, and 35 feet long and is pulled by Caterpillar diesel tractors. Below: Another outfit, two Caterpillar D8 tractors pulling plow and cable trailer, with another D8 pushing in reserve and a bull-dozer covering up the trench and levelling off the land, follows close behind the rooter.

in the United States for them this coming year. A large share of the financing is being handled by the Export-Import Bank.

Fifty Chinese are at TVA studying the engineering mechanics of chaining a river and the economic and social aspects involved in such a giant enterprise, while engineers, professors and architects have come from India, Peru, Palestine, Mexico and Egypt, with dreams of TVA's on the Ganges, the Yangtze, the Danube and the Amazon.

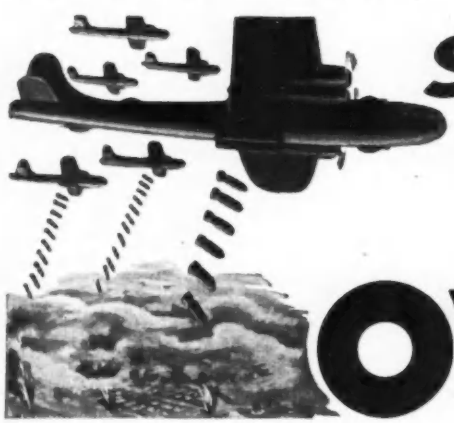
American engineers are being sent all over the world, to advise and make surveys for postwar projects. The Indian government has borrowed W. L. Vorduin, head of the TVA planning division, while Peru has acquired Barton M. Jones and Andrew M. Komora. James B. Hayes has become consulting engineer with the Commission on Palestine Surveys, while Thomas H. Hall is on assignment with UNRRA at Cairo, Egypt. A British Colonial mission is here to study town planning and Dr. K. L. Rao of the Madra, India public works department has been in the United States studying engineering projects. Brazil, Turkey, and Polish Government in Exile and Nigeria have all sent engineering and other experts in allied fields to the United States to study American engineering works.

Steel Industry Threatened With Iron Shortage

The steel industry is threatened with possible iron ore shortage, War Production Board officials warned members of the Iron and Steel Transportation Industry Advisory Committee at a recent meeting. This statement is based upon an estimated record low inventory at the start of the 1945 ore-movement season, and also reduced cargo capacity of the Great Lakes ore fleet due to lay-up of obsolete vessels, it was said.

Steel division officials reported that the estimated inventory of iron ore in mill stockpiles would amount to only about 16,000,000 tons on April 1, 1945, with a further drop to only 7,000,000 tons indicated by May 1, 1945. This compares with 21,000,000 tons on hand on April 1, 1944 and 34,000,000 tons at the record high level in 1942.

WPB spokesmen also listed manpower shortages and a possible late opening of the 1945 ore-movement season as contributing factors to an iron



SUPER-PERFORMANCE

Like that of the B-29, Owen superiority is based upon a thorough knowledge of the problem, expert designing and precision manufacturing from the most appropriate materials available.

The OWEN BUCKET Co.
6095 Breakwater Avenue, Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.

OWEN BUCKETS A MOUTHFUL AT EVERY BITE

SAVING BOTH SPACE AND WEIGHT

This is a pair of General Motors series 71 Diesel engines built side by side, delivering their power through a single shaft. It is Detroit Diesel engineers' answer to an urgent call for a lot of dependable Diesel power in a small space.

Some of the jobs assigned the basic series 71 power units in "Singles," "Twins," and "Quads" are among the toughest on the books today—powering landing craft and driving Army M-3, M-4 tanks and M-10 tank destroyers.

It takes "oomph"—plenty of it—to plow a tank through hip-deep mud, to lift it out of shell craters, to keep it hot after the enemy—to beach and extricate a landing craft when the breakers are running high.

So it is easy to look ahead and see how these "multiple" Diesels will take hold of the countless jobs of industry and perform them equally well—particularly where the ratio of power to weight or space is of prime importance.

And remember, these "Twins" and "Quads," like the single sixes, share all the important developments which General Motors has contributed to Diesel science.

KEEP AMERICA STRONG
BUY MORE WAR BONDS

GM
GENERAL MOTORS
DIESEL POWER

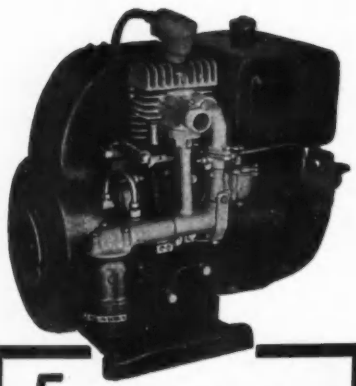
ENGINES . . 15 to 250 H. P. . . **DETROIT DIESEL ENGINE DIVISION,** Detroit 23, Mich.

ENGINES . . 150 to 2000 H. P. . . CLEVELAND DIESEL ENGINE DIVISION, Cleveland 11, Ohio

LOCOMOTIVES . . . . . ELECTRO-MOTIVE DIVISION, La Grange, Ill.

ore shortage. Committee members, however, expressed full confidence in the Iron Ore Advisory Committee, the furnace operators, as well as the lake carriers in estimating the iron ore needs and cargo capacity needed to transport it. The committee did recommend, nevertheless, that a sufficient number of small boats should be kept in operation to supply those furnaces which cannot receive ore in large type vessels due to channel limitations.

The 1944 ore movement on the Great Lakes closed on November 28th, marking the earliest closing date since 1919 with 1944 ore shipments totalling 81,171,438 tons compared with 84,424,852 tons in 1943 and 92,076,781 tons in the peak year 1942.



ELECTRICITY

For Any Job—Anywhere

ONAN ELECTRIC GENERATING PLANTS supply reliable, economical electric service for excavating and contracting uses as well as for scores of other general applications.

Driven by Onan-built, 4-cycle gasoline engines, these power units are of single-unit, compact design and sturdy construction. Suitable for mobile, stationary or emergency service.

Models range from 350 to 35,000 watts. A. C. types from 115 to 660 volts; 50, 60, 180 cycles, single or three-phase; 400, 500, and 800 cycle, single phase; also special frequencies. D. C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

Over 250,000 Now In Service

D. W. ONAN & SONS
3288 Royalston Ave.
Minneapolis 5, Minn.

ELECTRIC PLANTS Onan

Plans for $4,000,000 Airport at Wilkes-Barre Progressing

Plans are progressing for the $4,000,000 Airport under consideration at Wilkes-Barre, Pa., to be known as the AVOCA Airport, according to Congressman John Murphy of Scranton, Pa. Approximately $2,000,000 will be spent by the government in conditioning the land for the field with other miscellaneous improvements following.

Connecticut Plans Highway Development Program

Connecticut's State Highway Department is planning a $250,000,000 long-range highway development and integration program for postwar years, it was revealed in the biennial report of Commissioner William J. Cox.

A $35,000,000 program for immediate postwar highway construction and development had earlier been outlined in the report of the State Highway Advisory Commission. The large over-all program, it was explained, is long range and represents complete development of the state's highway network.

Included are plans for the construction and expansion of express highways through heavily travelled portions of the state and also for the reconstruction and development of presently inadequate sections of lesser-travelled roads.

The report explains that the express highway routes will follow the directions of the heaviest traffic arteries as revealed by statewide studies anticipating that traffic will materially increase after the war.

The long-range program as outlined, it was said, does not include anticipated postwar construction and development under terms of the federal highway aid plan.

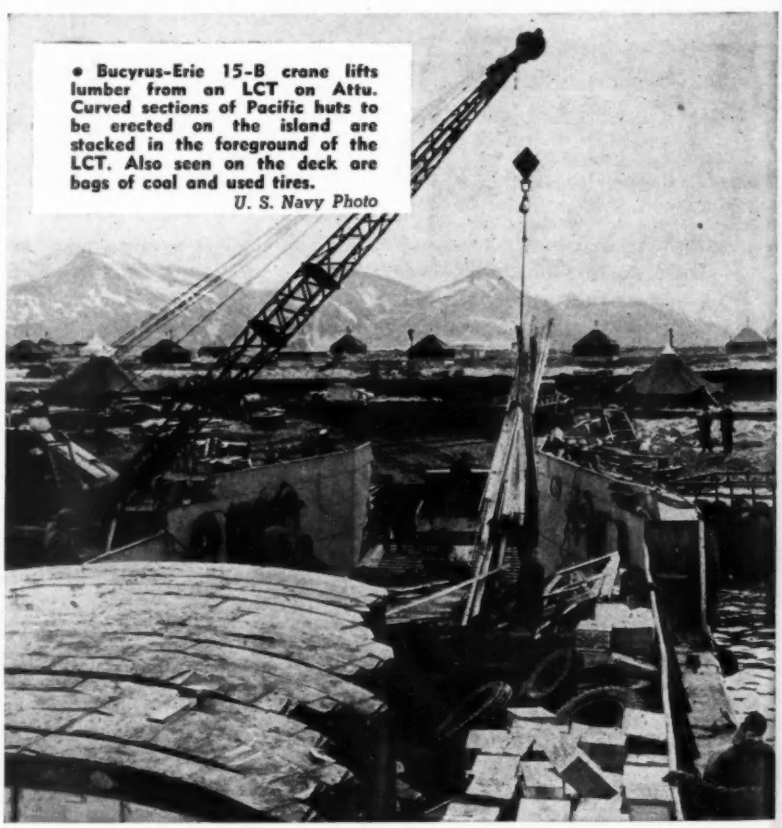
Besides express highways, the program includes plans for reconstructing inadequate sections of lesser travelled roads. On about 100 miles of two-lane roads, it is proposed to widen the narrowest sections, to flatten the sharp curves and to cut sidebanks or hillcrests to provide reasonably good thoroughfares.

"Well over 200 miles of our roads are too old and too crooked to allow adequate modernization," the report declares. "The total reconstruction of these is included in the program at amounts ranging from $50,000 to $150,000 a mile."

Minor improvements on about 150 miles of other old roads are contemplated at costs estimated at $15,000 a mile. Reconstruction and alteration of many bridges, inadequate for present-day vehicle sizes or loads, also is included in the program.

Civilian Lead Uses to be Restricted to 60%

The War Production Board announced that most civilian uses for lead will be restricted to the annual rate of 60 per



• Bucyrus-Erie 15-B crane lifts lumber from an LCT on Attu. Curved sections of Pacific huts to be erected on the island are stacked in the foreground of the LCT. Also seen on the deck are bags of coal and used tires.

U. S. Navy Photo

What about tracks and tires?

Every successful earthmover knows that a big job is likely to require different kinds of machines. He uses both track-type and wheel-type tractors—whichever kind of hauling power will move the *most yards* in the *fastest time* at the *lowest cost*.

BOTH HAVE THEIR PLACE

On all jobs, traction maneuverability and drawbar power are necessary. That's where track-type tractors handle yardage fast. Where dirt has to be hauled a long distance to the fill, the higher road-speed of rubber tires is an advantage.

"CATERPILLAR" BUILDS BOTH

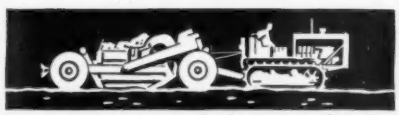
No manufacturer in the world has had more experience in building both track-type and rubber-tired earthmoving machinery than "Caterpillar." The great record of the "Caterpillar" track-type Tractor needs no comment. "Caterpillar" Diesel Motor Graders have rolled on rubber since they were introduced in 1931. And "Caterpillar" Diesel wheel-type Tractors have been delivering profitable high-speed performance for five years.

Your "Caterpillar" dealer offers *both* types of tractors and matched equipment. Therefore, he can give you unbiased counsel in helping you choose the right equipment for any earthmoving job. See him soon.

CATERPILLAR TRACTOR CO.
PEORIA, ILLINOIS

ZONE YOUR EQUIPMENT FOR LOWEST COSTS ON EARTH

ZONE 1 *Track-type tractors, equipped with bulldozers and rippers.*



ZONE 2 *Track-type tractors for loading and pulling scrapers.*

ZONE 3 *Wheel-type tractors for high-speed hauls.*

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

cent of the 1944 level through a complete revision of Order M-38.

The recently announced critical supply position of the metal, a result of mounting military demands, declining production and a dwindling Government stockpile, required this action, officials of the Tin, Lead and Zinc Division said.

Government officials reported that estimated 1945 requirements are 1,150,000 tons as compared with 970,000 tons of total supplies. Government reserves are less than one month's consumption and have been decreasing at a rate of from 15,000 tons to 25,000 tons per month during the last five months.

Every effort is being made to improve the labor situation in lead mines, mills and smelters, division officials said.

Plants engaged in the recovery and processing of secondary lead will receive all possible aid in obtaining needed manpower, the officials added, and the entire producing industry is asked to exert every effort with present facilities to increase its output to the utmost limits.

New York Has Postwar Fund of $310,000,000

New York State now has a $310,000,000 fund earmarked for postwar construction of highways, public buildings and other projects.

The fund was built up to that total when Gov. Thomas E. Dewey signed (Jan. 25) a bill adding to amounts previously set aside the state's current fiscal year surplus of approximately $150,000,000.

You won't find GENERAL EXCAVATOR listed in the Mortality Tables!

EVERY GENERAL BUILT SINCE 1927, ON WHICH THERE IS A RECORD, IS STILL AT WORK!

It's a fact! Every General Excavator built during the past 18 years, on which we are able to check, is still in action; doing a good day's work every day. Our records cover 98% of all Generals manufactured; the other machines are those sold by their original owners and on which we do not have recent information.

That's the kind of a performance record that has built confidence in General Excavators and Supercranes . . . confidence that will mean even more Generals at work during the postwar era. Include General in *your* postwar equipment plans! Get all the facts about the complete General line and be sure to inquire about the revolutionary new . . .

GENERAL TYPE 10

Combination Crane, Shovel, Dragline and Backhoe—One Man Controlled—One Engine Operated—On Rubber Tires

Postwar Priority Orders Now Being Booked

BUY MORE WAR BONDS AND KEEP THE BONDS YOU BUY

The OSGOOD COMPANY SHOVELS, DRAGLINES CRANES CRAWLER & WHEEL MOUNTED DIESEL, OIL, GAS, ELECTRIC

Associated with The Osgood Company

GENERAL EXCAVATOR CO.

MARION, OHIO

CRANES, DRAGLINES AND SHOVELS

OBITUARY

Burl Vance Hedrick

The life of the recently deceased Burl Vance Hedrick was an excellent example of a career of venturesome enterprise, versatile experience and success in the American tradition. His interests in local government, community affairs, church work and business enterprise were actively integrated.

Mr. Hedrick was owner and president of the B. V. Hedrick Gravel and Sand Company of Lilesville, North Carolina, at the time of his death. He was 68.

Raised on a farm Mr. Hedrick decided to enter his grandfather's profession of mining. He started work at 18 in the Bertha Zinc Mine in Virginia and after five years went to Villa Rica, Ga., as foreman with the Southern States Gold Mining Company. He also started contracting for tunnel constructions.

His accomplishments included watch repairing and the mercantile business. He prospected for gold and entered the hauling business in which he built special wagons and pioneered in steam tractor hauling.

Mr. Hedrick organized a construction company in 1920 and entered the road building field. He organized the Carolina Tractor Equipment Company in 1923 and sold this company in 1927. He then entered the automobile business and he also manufactured concrete pipe. He had organized his sand and gravel company in 1921.

Among Mr. Hedrick's other enterprises were: extensive real estate holdings, publisher of a daily newspaper, and continued invention of new equipment, including a rotary plow and a combination curb and gutter troweling face form for road and paving contractors.

Mr. Hedrick was extremely active in religious affairs and also served as mayor and city manager of Salisbury. He was a Mason, a Pythian and a Kiwanian. Mr. Hedrick was a former member of the board of directors of North Carolina General Contractors' Association and also a member of the board of directors of the National Sand and Gravel Association.

He is survived by his widow, three daughters, two sisters, five brothers and six grandchildren.

"Primacord helps us beat rising costs"

Getting more production out of each explosives load — out of each man's time — is the most logical antidote to rising expenses.

Primacord saves time. More holes are drilled because more holes can be shot at once. Loading, hooking-up and checking are simplified because this detonating fuse makes up with half-hitches and square knots in plain sight. Fewer men can accomplish more with Primacord.

Primacord saves explosives. Loads can be varied to meet conditions, and the detonating wave of Primacord, although practically instantaneous, still moves in sufficient sequence to relieve burdens from row to row. Every cartridge, even in decks, gets a full power detonation. Every shot can accomplish more with Primacord.

Primacord helps achieve safety. It must be detonated, which makes it safer to store, distribute and load. Caps are attached to the trunk line only — none into the hole. Lost time accidents can be reduced with Primacord.

THE ENSIGN-BICKFORD COMPANY · Simsbury, Connecticut

P-4

It's three strikes and out for lost production with Primacord on the mound.

Also

ENSIGN-BICKFORD SAFETY FUSE

Since 1836

PRIMACORD-BICKFORD

Detonating • Fuse •

Equipment you ought to KNOW ABOUT

For further details about the equipment on these pages please write to the manufacturer, mentioning Excavating Engineer.

Hydraulic-Spring Operator's Seat

Manufacturer: Monroe Auto Equipment Co., 43 East Ohio Street, Chicago 11, Ill.

Claims: Increased comfort is claimed for operators of road-building equipment and tractors with a new principle in seating which levels off the ride regardless of the jolts taken by the vehicle. Fatigue is reduced where rough riding usually lowers work capacity. Utilizes a special variable rate spring which reacts equally to large men or small boys. A double-action hydraulic shock absorber resists down and up actions and a stabilizer bar prevents side sway.

Electric Drill with Plastic Case

Manufacturer: Independent Pneumatic Tool Co., 600 West Jackson Blvd., Chicago 6, Ill.

Claims: This new portable electric drill, 20 per cent lighter than comparably rated drills with aluminum casings, is made of specially-developed "Thorite" plastic. The new case has surpassed performances of heavier metal housings for durability and cool, easy handling, the manufacturer has stated. The new drills are of the side handle type.

All internal operating parts are supported in a metal frame entirely separate of the plastic housings—an independent unit so constructed that the tool will operate perfectly with all housings detached.

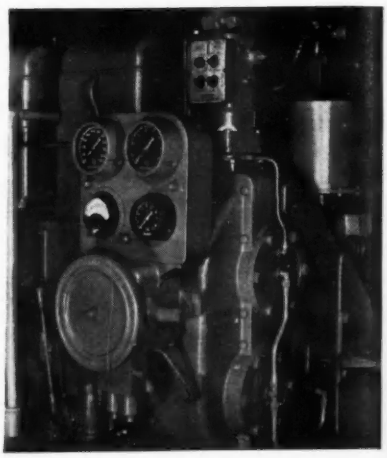
Available in three speeds, 2500 r.p.m., 3750 r.p.m., and 5000 r.p.m., weigh 3½ pounds, and are 7-9/16" in length.

Dual-fuel Diesel Engine

Manufacturer: The Cooper-Bessemer Corp., Mount Vernon, Ohio.

Claims: The operation of a natural gas engine on the diesel principle without an electrical sparking device and quick convertible to several fuels is claimed by the manufacturer for this new machine.

It is stated that the unit burns, in addition to natural gas, fuel oil, refinery by-products, sewerage gas, and coke oven gases. Conversion from liquid to gas fuel at normal pressures is possible with the closing of one valve and the opening of another while the engine operates continually at full load. A cut in fuel consumption from 20 to 25 per cent is claimed with the normal 25 per cent thermo-efficiency of the gas engine raised to 35 per cent thermo-efficiency common in diesel oil engines. One of the engines is rated at 675 h.p. at 400 r.p.m.



The manufacturer added that the new discovery may mean the elimination of fire and explosion hazards in the gasoline refining industry for no sparking device is used on the engines.

Dust Proof Goggles

New virtually dust proof goggles recently announced by the Quartermaster Corps may find extensive post-war application on all dirt-moving projects. Designed to exclude dust, the goggles underwent intensive laboratory tests during development and now are being supplied to members of the Armored Command and other vehicle operators.

The lens is made of shatterproof plastic that can be cleared of grit or mud by the soldier with one swipe of his sleeve. Replacement lens can be installed in a few seconds and spare green polarizing lens are available for excessive glare conditions.

Oil-resistant synthetic rubber, free from skin irritants, enables the frame to fit snugly and comfortably on the face. The soft rubber molds the frame to the face contour and rests on the cheek bones and the bridge of the nose. Ventilation is afforded through small cloth-screen filtered holes around the edge of the frame.

Research by the Armored Medical Research Laboratory at Fort Knox shows the goggles have the widest range of vision of any goggles tested.

Ground Resistance Tester

Manufacturer: Associated Research, Inc., 231 S. Green St., Chicago 7, Ill.

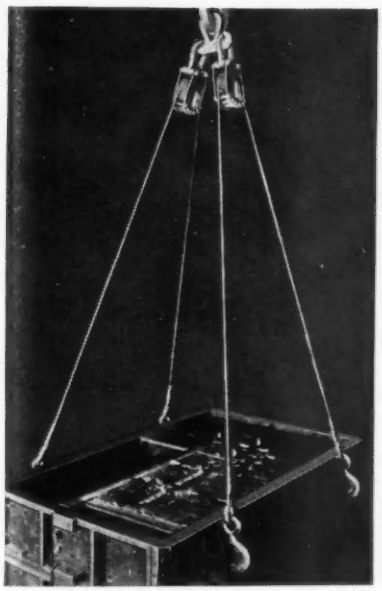
Claims: This new tester is designed to provide necessary protection of life

and property by testing in fields where grounding is essential. Manufacturer claims a greater range of low and high ground electrical resistance testing possibilities, especially where arid or wet regions or where extremes of dryness or moisture are found. Light, portable, has four ranges 0-3, 0-30, 0-300, 0-3000 ohms with self-contained power supply which eliminates hand cranking. With its direct readings no calculations are necessary.

"Level-Lift" Slings

Manufacturer: Macwhyte Company, Kenosha, Wis.

Claims: Formerly made only in three-ton and six-ton capacities, two new sizes increase the range of these slings to ¾-ton and 1½-tons. They are self adjusting and automatically level any load. Reported to be simple in operation, one sling leg of rope becomes longer than the other and, as the weight pulls on the wire rope,



the sheave in the block pulls down against a brake which prevents slippage.

Redistribution Center

(Continued from page 194)

do not require initiative in finding a new and better way to handle it. For instance, recently there was a million pounds or more of new steel pipe to be handled. It had to be unloaded from railroad cars and then stacked. To facilitate its handling and to speed up the process the Engineers made a special sling so that the Bucyrus-Erie 44-B crane could handle 15 lengths of pipe at a time. Two lengths of steel bar with 15 projecting lugs on each of the bars were attached to the crane hook by four cable slings, one from each end of the two bars. The hollow ends of each pipe to be lifted were fitted over the lugs on the parallel bars.

A Lorain ¾-cu. yd. Motocrane with a 40-ft. boom, mounted on a ten-wheel tandem drive truck is used where short jobs are spotted long distances apart in the yard, since it can be speeded to the place where it is needed about as quickly as a truck, finish its task and then be driven to another small job without much loss of time. It is used principally for finishing up odd jobs around the yard.

A Link-Belt 1½-cu. yd. crawler crane with a 50-ft. boom is used for general utility work loading and unloading heavy materiel. It is equipped with a Waukesha diesel engine and a Rudomatic tag line.

For jobs requiring a long reach a Model 8 Northwest with a 75-ft. boom is used. This machine is powered by a Twin City four-cylinder engine.

Smallest on the job is a Burro railroad crane rated at ½-cu. yd. and powered by a Hercules gasoline engine. This crane is equipped with a 30-ft. boom and although its realm of activity is confined to areas near the railroad tracks, it is kept quite busy all of the time.

Civilian employees are used to operate all the cranes and for much other work at the Center.

The Center maintains its own carpenter shop for uncrating and recrating goods. All discarded crates are culled for usable lumber for making new crates.

As any construction man or engineer knows, you've got to know not only what you have in stock, but also where you can find it. So this widely varying stock of continually arriving materiel is listed and stacked. Pipe and steel must be protected against damaging rust and parts must be kept in usable condition against the time when sweating engineers will be trying to put them on damaged machines in zones where the things that are buzzing are not flies.

All materiel arriving and on hand is checked, segregated and then entered on a list that is sent to the South Atlantic Division Office in Atlanta, Georgia, from where details of equipment are transmitted to all branches of the service which might be interested.

Obviously the money-saving of this job which is being so capably handled by Captain Roth is tremendous. Some materiel may be used two or three times on various fronts and then wind up again at the Redistribution Center.

The Redistribution Center is also used to advantage as depository for finished materiel from contractors with terminated contracts. Delivery of this materiel is made to the Center where it is stored, protected and shipped to the proper governmental agency on order.

It's easier to lift, lower, push or pull the Simplex Way!

Simplex
LEVER · SCREW · HYDRAULIC
Jacks

for every construction purpose
Awarded the Gold Medal for Safety
Ask for Catalog 44
Templeton, Kenly & Co., Chicago 44, Ill.

LA CROSSE HEAVY DUTY MACHINERY TRAILERS
are sold exclusively in
WISCONSIN
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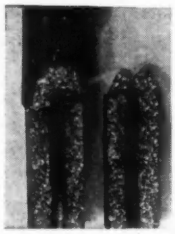
DROTT TRACTOR COMPANY, INC.
MILWAUKEE

LA CROSSE TRAILER & EQUIPMENT CO.
LA CROSSE WISCONSIN

tities of steel between the forge shop and the job, and also reduces the amount of steel tied up in one place. Most sizes of detachable bits may be reground several times. Shank ends of the drill steel and the ends of the pistons in the rock drills should be ground square but not so much that the soft metal of the core is exposed. When forging a bit, the blacksmith must use care in shaping the piece and pay careful attention to heat treating. Handle the bar steel carefully because any nick on the surface may be the origin of a fracture. When the steel is heated, the heated area should be no longer than is necessary. (Drill steel forging temperature should be kept between 1900° and 2100° Fahrenheit. These temperatures color the metal orange to lemon yellow.)



• Fig. 4—High forging temperatures has caused this drill shank to be burned.

Steel kept at high temperatures while forging induces decarburization which reduces wearing and cutting qualities (fig. 4). Pay attention, too, to the hole in hollow steels, for if too small it will restrict the flow of air or water and cause water tube damage in wet machines.

Harden bits by heating to 1450° Fahrenheit, submerge in ¾-inch running water or brine, and when the color fades completely the entire end should be submerged. If your locality has alkaline water, use rain water for this operation.

Drill shanks may be heated to 1550° and quenched in circulating quenching oil for a Brinell of 350 to 400.

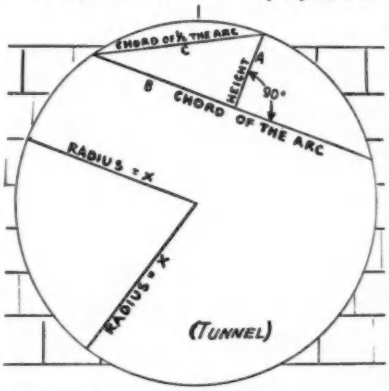
Compressed Air Institute

Finding Bend Radius

Men in the field often have the problem of establishing the radius of bends to conform with tunnel ceilings, cess-pools, and tanks. Perhaps they have the job of forming conduit, pipe, reinforcing rod, etc., which would be easy if the radius were known. To obtain the radius the following formula may be used:

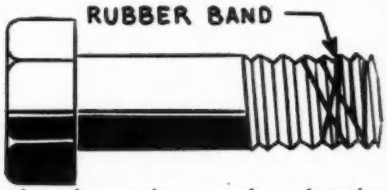
$$R = \frac{C2}{2A}$$

where radius equals the chord of one half the arc squared divided by twice the height of the arc. **By Myron Carl**



Effective Lock Nut

A rubber band can effectively lock a nut if wrapped around the threads of the bolt before the nut is turned on. The rubber band may be chewed up when the nut is screwed on, but the particles of rubber will continue to hold the nut against vibration which might loosen it. **By W. F. Schaphorst**



For Fewer Shutdowns, Greater Production and..

"HERCULES" (RED-STRAND) PREFORMED WIRE ROPE

...Lower Costs

YOU men who use wire rope know best what it means when a rope has to be replaced . . . Production stops, but operating expenses continue.

Time out for replacements can be minimized by the use of Preformed "HERCULES" (Red-Strand) Wire Rope, because this rope is the right combination of strength, toughness and durability, plus the definite advantages of preforming—the process that makes good wire rope better. As "HERCULES" is furnished in a wide range of constructions, there is—in this one grade—a right rope for every heavy duty purpose.

Preforming High-Lights

As the wires and strands are shaped to the normal form they occupy in the rope, there is less turning and twisting...less wear ...longer life.

It is more flexible, which combined with its inert qualities, make for smoother spooling... faster handling.

The preforming process reduces the tendency of Lang Lay wire rope to loop and squirm—thereby making it possible to utilize the many basic advantages of Lang Lay for more purposes.

MADE ONLY BY
A. LESCHEN & SONS ROPE CO.
WIRE ROPE MAKERS — ESTABLISHED 1857
5909 KENNERLY AVENUE — ST. LOUIS, MISSOURI, U. S. A.

NEW YORK • • • 90 West Street
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SEATTLE • • 3410 First Avenue South

Notes from the manufacturers

Barber-Greene Co., Aurora, Ill., has appointed Brandeis Machinery & Supply Co., Louisville 8, Kentucky, Parmenter & Andre, Grand Rapids, Michigan, and Carroll-Edwards & Co., Cincinnati, Ohio, representatives for their construction and industrial Divisions. The company also announces the reappointment of Lt. Col. C. B. (Cliff) Gould, manager of its Detroit office. Col. Gould returns to his previous position after several years with the Army Air Corps.

George Haiss Mfg. Co., Inc. of New York, N. Y., announces the appointment of the following new distributors: The Coast Equipment Co., San Francisco, Calif.; Union Tractor & Harvester Co. Ltd., Calgary, Alberta; Plains Machinery Co., Plainview, Texas; G. C. Phillips Tractor Co., Birmingham, Ala.; Harrod Equipment Co., Syracuse, New York; Herman M. Brown Co., Des Moines, Iowa, and A. M. Flanders, Inc., Barre, Vermont.

American Hoist & Derrick Company of St. Paul, Minn., at its recent board of directors meeting elected Frederic Crosby, chairman of the board; Harold O. Washburn, president; R. E. Ljungkull, vice-pres. of engineering; D. B. Botkin, vice-pres. of manufacturing; S. M. Hunter, vice-pres. of sales; J. F. Bishop, secretary and ass't treasurer, and R. J. Henry, ass't secretary.

Hal G. Sours and Eugene E. Baldwin of Columbus, Ohio announce the formation of their partnership known as "Baldwin & Sours" with offices at Columbus, Ohio. The firm will distribute road surfacing materials and equipment.

Mr. Sours has been in State and County highway work for the past 24 years, and is a former Director of the Ohio State Highway Department. Mr. Baldwin was associated with the firm of Taylor & Baldwin for 20 years.

Pacific Car & Foundry Co. of Seattle and Renton, Wash., acquired controlling interest in the Kenworth Motor Truck Corp. of Seattle. Paul Pigott, president, will also head the truck firm.

Gardner-Denver Co. of Quincy, Ill., recently appointed Gilbert H. Gaus manager of its New York branch to succeed G. V. Leece, new export division head. Associated with Leece are S. T. Brown and Harold Weber.

R. G. LeTourneau, Inc. of Peoria, Ill. has promoted M. E. "Cap" Miller from District Representative to Central Sales Manager with offices in Peoria. Mr. Miller headquartered in London, England until 1940 and recently has served in the south and southwestern states. He succeeds Howard L. Stilley who is now manager of the Soule' Equipment Company at Oakland, Calif.

Worthington Pump and Machinery Corp. of Harrison, N. J. announces the acquisition of the Ransome Machinery Co. line of concrete machinery. C. F. Oechsle, Worthington's assistant vice-president, has been placed in charge of the Worthington-Ransome Construction Equipment Sales Organization, with headquarters at Holyoke, Massachusetts. He is assisted by W. F. Lockhardt, and W. J. Fleming.

Davey Compressor Company of Kent, Ohio, announces the appointment of Hoye and Williams, Shreveport, La., as their agents in the northern Louisiana territory. C. R. Hoye, Jr., was formerly secretary-treasurer of Glassel-Taylor Construction Company in Shreveport, while R. L. Williams, an expert machinist, has been associated with the contractor and building fields.

Caterpillar Tractor Co., Peoria, Ill., has promoted C. A. Woodley to Assistant General Factory Manager and William Naumann to Factory Manager, it was announced by James R. Munro, General Factory Manager. Before the promotions, Mr. Naumann was Assistant Factory Manager to Mr. Woodley.

New trade literature

Title: "Hercules and the War"
Subject: Here is the story of Hercules engines of war as told by the news commentator Lowell Thomas. In its 38 pages are the tales of these motors as used during this war at the battlefront and at home. A full size booklet, well illustrated.
Where to Get: Hercules Motors Corporation, Canton, Ohio (Free).

Title: "The Highway to Alaska"
Subject: The miraculous construction job of the "Highway to Alaska" is photographically captured in this 16 mm. Kodachrome film, with sound, which illustrates in 22 minutes the highlights of America's glory road as photographed by globe trotter Herbert C. Lanks.

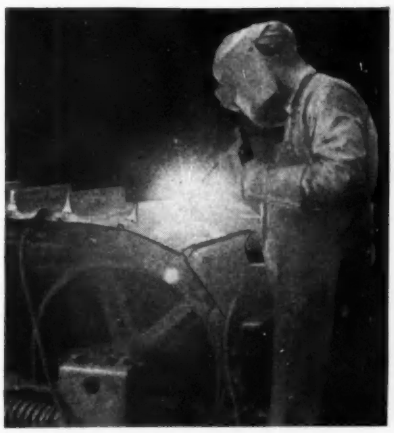
The film records scenery and action in the swamps, mountain crags, Arctic rivers, and stubborn forests of seven U. S. Army regiments and 50 contractors battling formidable barriers before completing the job in seven crammed months.

Film is available to all interested groups, without charge, in sound-on-film only and cannot be run on a silent projector. Mention the date wanted.
Where to Get: Tractor Division, Photography Department, Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Title: "The Dragliner—Catalog No. 14"
Subject: A new 24-page catalog showing the complete line of Dragliner dragline buckets, also describes Daniels-Murtaugh fabricated "Coaloader" dippers, and DMCO Teeth for dragline buckets and dippers of all makes. The catalog also tells how to recognize the Daniels-Murtaugh Dragliner and the features of the "flat top" arch.
Where to Get: Daniels-Murtaugh Co., 625 C Avenue, N.W., Cedar Rapids, Iowa (Free).

Title: "Kotal Mixes"
Subject: Of interest to highway engineers should be the results and the detailed description of an interesting new test for cutback asphaltic mixes as outlined in this pamphlet. Conducted by a well known New York laboratory, the conventional stripping test was followed by a Hubbard field stability test of the same sample. A chart showing the results and directions for conducting similar tests for verification are given.
Where to Get: Kotal Company, 52 Vanderbilt Ave., New York 17, New York.

REBUILD!
worn track shoes with Alligator Grip Lugs.
For any Crawler type or Track-laying Equipment



Get Better Traction and More Pulling Power with ALLIGATOR TRACTOR GRIP LUGS!
Send for Bulletin EE 12
PAN-AMERICAN STEEL PRODUCTS COMPANY
815 Superior Avenue Cleveland 14, Ohio

• **Left: American Army doctor, assisted by two Burmese nurses and a wounded Chinese soldier, probes for shrapnel in the back of a Chinese soldier wounded during the fight to clear the Japs from Burma. Above: Dr. Seagrave cruises out in one of two jeeps he took to the Tounge Front. One of his Burmese nurses drives and two others sit in the rear. Top of jeep is camouflaged.**
U. S. Signal Corps Photos

Ledo Road

(Continued from page 193)

way, half way between Myitkyina and Mogaung.

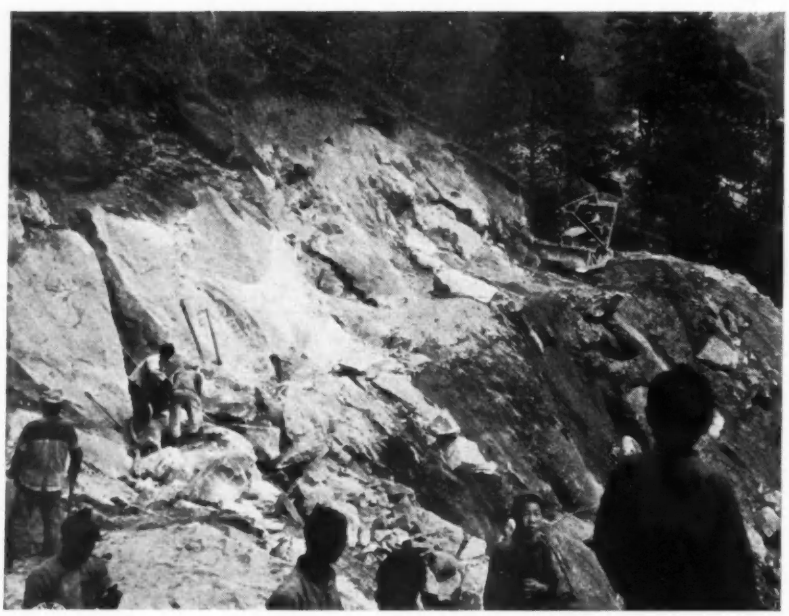
Leap-frogging along this access road, units would build a four or five mile stretch of roadway, then move forward ahead of other units and start new traces. The engineers worked around the clock. Mobile generators supplied power for huge floodlights which were supplemented by oil flare pots.

Causeways Built

Long lines of bulldozers and scrapers chewed away at the mountainsides as tons of earth were moved into the swamplands where 15-foot high dirt causeways were built across areas which were inundated with five to ten feet of water during the monsoon. And, all through this causeway system a network of culvert was installed to provide proper flood control during the rains.

Simultaneously, other engineers pushed through a combat road from Warazup to Kamaing, where a Jap-constructed trace led down to Mogaung and skirted the railroad to Namti and Myitkyina. Using this rough, narrow road, convoys of supplies and equipment, tanks and artillery were soon moving from Ledo to Myitkyina.

• **Chinese coolies working on the Ledo Road look on as LeTourneau bulldozer operated by T/5 Bill Moran of Omaha, Ill., clears newly graded road of dirt.**
U. S. Signal Corps Photo

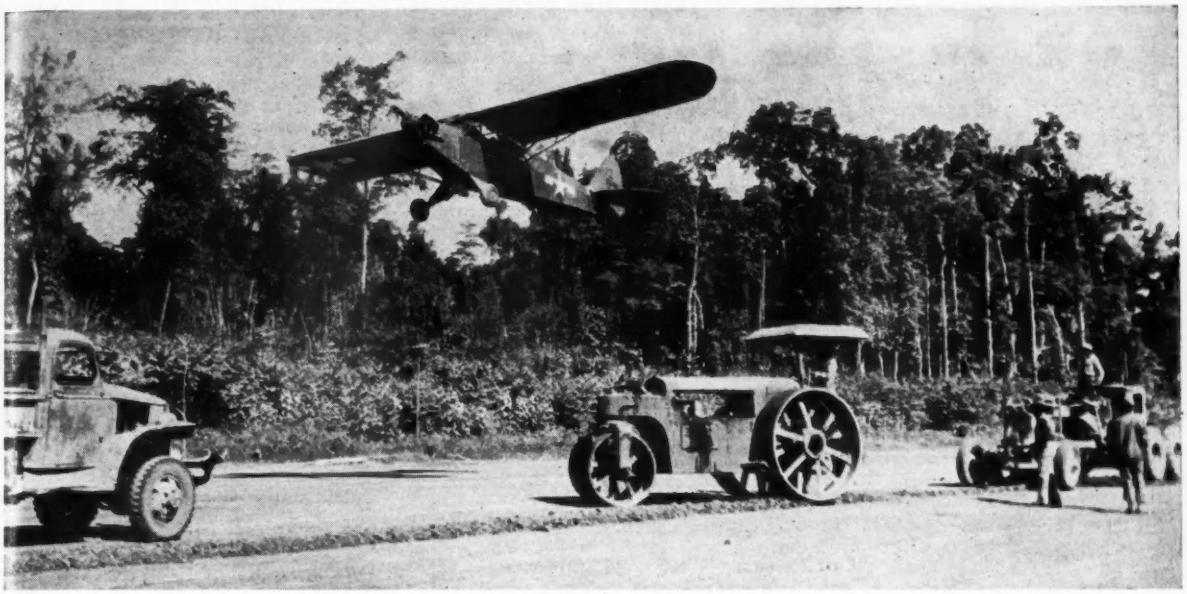


The two engineering battalions which had fought at Myitkyina were re-equipped. One was detailed the job of strengthening bridges in the Hukawng Valley. The other was given the job of pushing the road south of Myitkyina to Bhamo, keeping the point right behind the advancing infantry. In fact, the engineers sent out crews of men with mine detectors in advance of their lead dozers. Thus, mid-November, 1944, saw a chain of veteran Ledo Road engineers building the highway from the swamplands and hills south of Warazup to the rice paddies of the Bhamo sector.

After the fall of Bhamo in December, 1944, the engineers moved on toward the Namhkan-Wanting area, improving a rough, narrow road to handle heavy convoy traffic into China. These engineers worked on the fringe of enemy-held territory, sometimes within sight of the front lines.

436 Miles in 15 Months

During the first ten months of the Ledo Road project 42 miles of road were built. In the next 15-month



• U. S. Army planes are using the Ledo Road in Burma for evacuation of the wounded in the China-Burma-India Theater. A cub plane of the U. S. Army Air Forces Liaison Squadron makes use of a landing strip along the Road while the strip is still under construction.
U. S. Signal Corps Photo

period, after General Pick took over command of the project, 436 miles of road were built and improved, from Pangsau Pass to Wanting on the China-Burma border.

American engineers had accomplished a task which had been branded, "impossible"—they constructed a permanent, all-weather supply highway from India to China, through towering jungled mountains and across swamplands and rice paddies, despite the heaviest rainfall in the world.

Today Ledo Road is 478 miles of modern American engineering skill stretched across the broad green tapestry of a remote uncharted jungle world, a lifeline to sustain the Chinese in their battle against the evils of totalitarian aggression. The progress of construction represents about one mile of road completed per day over a route that passes through 102 miles of mountain section containing approximately 4,000 foot passes.

During seven months (March through October, 1944) of the 15-month construction period, 175 inches of rain fell in the mountains and 100 inches of rain were recorded in the valley. By way of comparison, the eastern coast of the United States has an average of less than 45 inches of rain annually.

In addition to the remarkable rate of progress maintained on the Ledo Road proper, the construction troops were called upon to build several hundred miles of combat roads, temporary supply roads, pack trails and access roads.

While the construction of roads was the designated mission of the troops who have completed this vital link between India and the Burma Road, this is, by no means an indication of the total accomplishments in the field of construction during this 15-month period.

Airfields were constructed having a combined seal-coat surfaced runway area of about 340,000 square yards, or approximately 70 acres. In addition to the main runways, it was necessary to construct, at each of the airfields, thousands of feet of taxiways leading to surfaced aprons, revetments and dispersed parking areas which more than doubled the area surfaced for the runways proper. Numerous liaison strips were also constructed along the route to support combat and supply operations.

• Sgt. Alexander W. Pavlushik of Sioux City, Ia., pilot, lands his cub liaison plane at his base airport with a wounded Chinese soldier evacuated from the front by air.
U. S. Signal Corps Photo

NOT in the *Contract*

Miss Sophia Jones tripped into a lawyer's office, and asked: "Can't Ah sue dat no-good Rastus Smiff fo' somepin, Mister? He promised to marry me an' he 'loped wid another gal!"

"Promised to marry you, eh?" mused the lawyer. "Well, Sophia, have you anything in black and white to show for it?"

"No, suh . . . jes black am all."

Teacher—"If a number of cattle is called a herd and a number of sheep a flock, what would a number of camels be called?"

Little Johnnie—"A carton."

"I'm sorry I slapped you, I thought you were trying to get my sorority pin."

"I'm sick of marriage. Tom hasn't kissed me since I came back from my honeymoon."

"Why not divorce him?"

"Huh? Oh, I'm not married to Tom."

A girl once dreamed that a strange man kidnapped her, drove to a lonely spot in the country, and stopped the car.

"What are you going to do now?" she screamed.

"That's up to you, lady; it's your dream," was the reply.

The only difference between Burma and hell is that hell has a dry climate.

Upon seeing a little girl lead a cow along a country road, the parish minister stopped her and asked:

"Little girl, where are you taking the cow?"

"To the bull," replied the little girl.

"Can't your father do it?" questioned the clergy, somewhat taken aback.

"Nope," answered the young lassie, "only the bull."

The two softest jobs in the world: Hair-dresser to Mussolini and minister of justice for Hitler.

" — I figure he's one of the best men I have, so why should I criticize his methods!"

It was the first time she had been to dinner with them, and they smiled indulgently as she refused a whiskey and soda.

"I've never touched it in my life," she explained.

"Why not try it?" urged her host. "See if you like the taste."

She blushed and shyly consented, and he poured her out a mixture which she delicately raised to her lips.

"Why," she cried, "you've given me Scotch!"

Old Maid: "An intoxicated man got into my house by mistake last night and you should have seen his embarrassment."

Spinster: "I'll bet he was put out, all right."

Old Maid: "I'll take that bet!"

A soldier asked his colonel for leave to go home to help his wife with the spring house cleaning.

"I don't like to refuse you," said the colonel, "but I've just received a letter from your wife saying that you are no use around the house."

The soldier replied: "Colonel, there are two persons in this regiment who handle the truth loosely, and I'm one of them. I'm not married."

"McTavish, here comes a guest for supper."

"Quick, everybody! Grab a tooth pick and run out on the front porch."

"You say you got that black eye fighting for a woman's honor?"

"Yep, she wanted to keep it."

The old-timer, looking bent, weary, and dejected, hobbled painfully up to the bar. "What's the trouble?" asked a kindly acquaintance. "You look bad."

"It's yoorz," moaned the old-timer. "I've got a bad case of yoorz."

"What's yoorz?" asked the puzzled friend.

"A double Scotch, thanks."

A cute little lass approached the floorwalker and asked, "Do you have any notions on this floor?"

The floorwalker looked her over, and then remarked, "Yes madam, but we suppress them during working hours."

"Did you have a good time at the party, Phyllis?"

"Nope — I had too much will power."